RM

COMMONWEALTH OF MASSACHUSETTS



CONTRACT DOCUMENTS AND SPECIAL PROVISIONS

PROPOSAL NO.	608744-136412
P.V. =	$15,168,000.00
PLANS	YES

FOR

Federal Aid Project No. STP/CMQ/TAP/PRC(PRC80)/FLP-0035(070)X
Corridor Improvements and Related Work on Shank Painter Road,
from Route 6 to Bradford Street

in the Town of

PROVINCETOWN

In accordance with the STANDARD SPECIFICATIONS
for HIGHWAYS and BRIDGES dated 2026

This Proposal to be opened and read: **TUESDAY, SEPTEMBER 15 2026 at 2:00 P.M.**

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DOCUMENT 00104

NOTICE TO CONTRACTORS

Electronic proposals for the following project will be received through the internet using www.bidx.com until the date and time stated below and will be posted on www.bidx.com forthwith after the bid submission deadline. No paper copies of bids will be accepted. All Bidders must have a valid vendor code issued by MassDOT in order to bid on projects. Bidders need to apply for a Digital ID at least 14 days prior to a scheduled bid opening date with www.bidx.com.

TUESDAY, SEPTEMBER 15 2026 at 2:00 P.M.**

PROVINCETOWN

Federal Aid Project No. STP/CMQ/TAP/PRC(PRC80)/FLP-0035(070)X
Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street

****Date Subject to Change**

PROJECT VALUE = $15,168,000.00

Bidders must be pre-qualified by the Department in the HIGHWAY CONSTRUCTION category to bid on the above project. An award will not be made to a Contractor who is not pre-qualified by the Department prior to the opening of Proposals.

All prospective Bidders who intend to bid on this project must obtain "Request Proposal Form (R109)". The blank "Request Proposal Form (R109)" can be obtained at: https://www.mass.gov/prequalification-of-horizontal-construction-firms.

All prospective Bidders must complete and e-mail an electronic copy of "Request Proposal Form (R109)" to the MassDOT Director of Prequalification for approval: prequal.r109@dot.state.ma.us.

Proposal documents for official bidders are posted on www.bidx.com. Other interested parties may receive informational Contract Documents containing the Plans and Special Provisions, free of charge.

Bids will be considered, and the contract awarded in accordance with statutes governing such contracts in accordance with Massachusetts General Laws Chapter 30 § 39M.

The Project Bids File Attachments folder for proposals at www.bidx.com shall be used for submitting at the time of bid required information such as the Bid Bond required document, and other documents that may be requested in the proposal.

NOTICE TO CONTRACTORS (Continued)

All parties who wish to have access to information plans and specification must send a "Request for Informational Documents" to MassDOTBidDocuments@dot.state.ma.us.

A Proposal Guaranty in the amount of 5% of the value of the bid is required.

This project is subject to the schedule of prevailing wage rates as determined by the Commissioner of the Massachusetts Department of Labor and Workforce Development, and the Division of Occupational Safety, and the United States Department of Labor.

The Massachusetts Department of Transportation, in accordance with Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby affirmatively ensures that for any contract entered into pursuant to this advertisement, all bidders, including disadvantaged business enterprises, will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin in consideration for an Award.

This Proposal contains the "STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)". The goals and timetables applicable to this proposal for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all work, are contained in Appendices A and B-80 of the above specifications.

The Contractor (hereinafter includes consultants) will comply with the Acts and Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this Contract as contained in Appendices C and D of the above specifications.

NOTICE TO CONTRACTORS (Continued)

PRICE ADJUSTMENTS

This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For reference the base prices are as follows: liquid asphalt $712.50 per ton, Portland cement $452.13 per ton, diesel fuel $4.372 per gallon, and gasoline $3.335 per gallon, and Steel Base Price Index 370.1 MassDOT posts the **Price Adjustments** on their Highway Division's website at
https://www.mass.gov/massdot-contract-price-adjustments

This Contract contains Price Adjustments for steel. See Document 00813 - PRICE ADJUSTMENT FOR STRUCTURAL STEEL AND REINFORCING STEEL for their application and base prices.

MassDOT projects are subject to the rules and regulations of the Architectural Access Board (521 CMR 1.00 et seq.)

Prospective bidders and interested parties can access this information and more via the internet at WWW.COMMBUYS.COM.

BY: Phillip Eng, Interim MassDOT Secretary
Jonathan L. Gulliver, Undersecretary and Highway Administrator
SATURDAY, AUGUST 15, 2026

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DOCUMENT 00210

REQUIREMENTS OF MASSACHUSETTS GENERAL LAWS
CHAPTER 30, SECTION 39R;
CHAPTER 30, SECTION 39O

July 1, 1981, updated October 2016

M.G.L. c. 30, § 39R. Award of Contracts; Accounting Statements; Annual Financial Statements; Definitions.

(a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) “Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A to forty-four H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(2) "Contract" means any contract awarded or executed pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

(3) “Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.

(4) “Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

(5) “Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

(6) "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

(7) “Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A 1/2 to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:

(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

(2) Until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and

(3) If the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

(4) If the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

(5) If the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

ii. to maintain accountability for assets;

(3) access to assets is permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he has examined the statement of management on internal accounting controls, and expressing an opinion as to:

(1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and

(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

(e) The office of inspector general, the commissioner of capital asset management and maintenance and any other awarding authority shall enforce the provisions of this section. The commissioner of capital asset management and maintenance may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.

(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b).

M.G.L. c. 30, § 39O: Suspension, Delay, or Interruption or Failure to Act by Awarding Authority; Adjustment in Contract Price; Submission of Claims.

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

<<<<<<<<<<>>>>>>>>>>

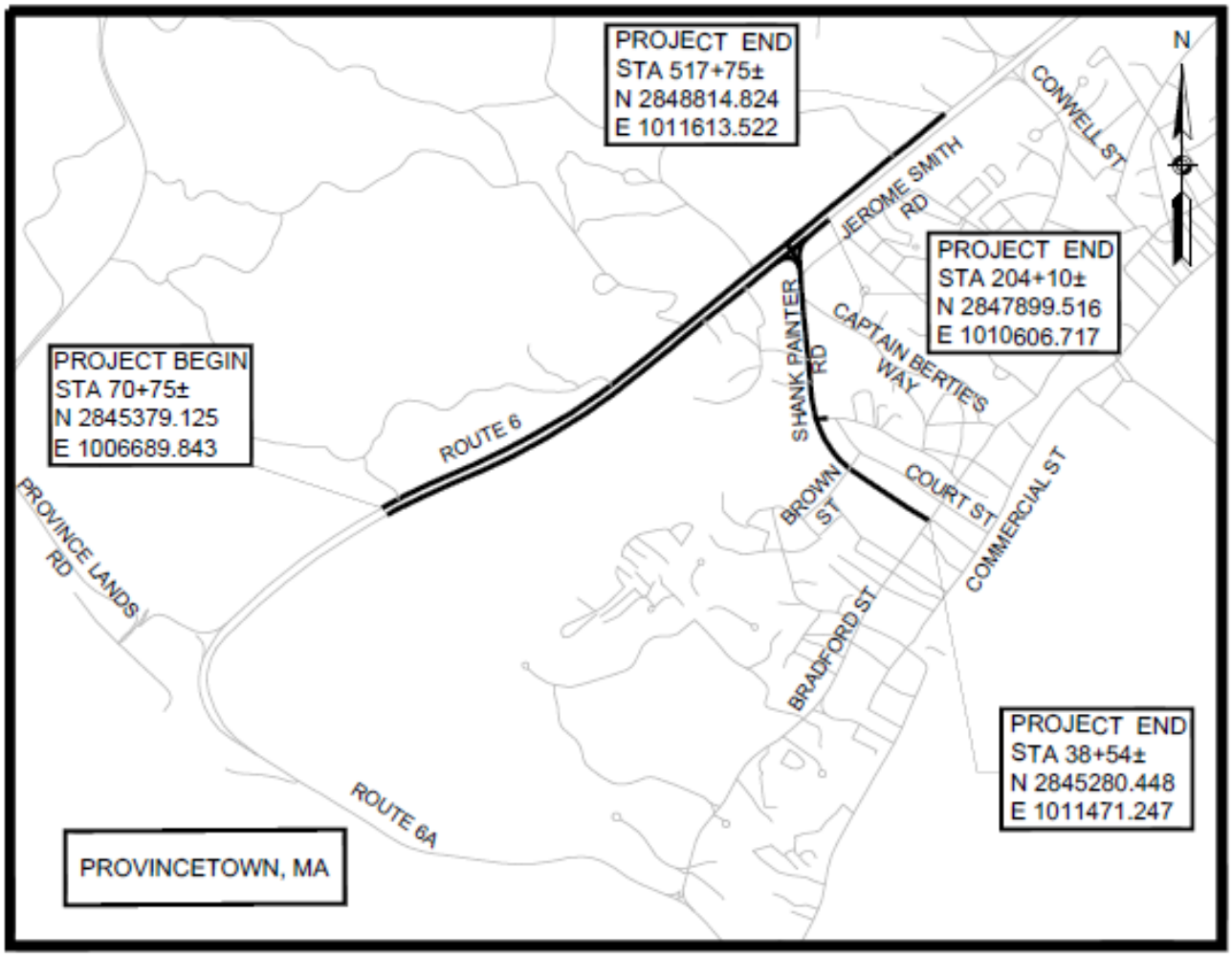
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DOCUMENT 00331

LOCUS MAP

PROVINCETOWN
Federal Aid Project No. STP/CMQ/TAP/PRC(PRC80)/FLP-0035(070)X
Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street



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DOCUMENT 00439

Final Report ☐

Interim Report ☐

CONTRACTOR PROJECT EVALUATION FORM

For instructions on using this form, see Engineering Directive E-10-002, Dated 4/20/2010

Date: _____

City/Town: _____ Contractor: _____

Project: _____ Address: _____

F.A. No. _____ Contract Number: _____

Bid Price: _____ Notice to Proceed: _____

Funds: State: _____ Fed Aid: _____ Current Contract Completion Date: _____

Date Work Started: _____ Date Work Completed*: _____

Contractor's Superintendent: _____

Division: (indicates class of work) Highway: _____ Bridge: _____ Maintenance: _____

*If work was NOT completed within specified time (including extensions) give reasons on following page.

	Excellent 10	Very Good 9	Average 8	7	Fair 6	5	Poor 4	% Rating
1. Workmanship								x 2=
2. Safety								x 2=
3. Schedule								x 1.5=
4. Home Office Support								x 1=
5. Subcontractors Performance								x 1=
6. Field Supervision/ Superintendent								x 1=
7. Contract Compliance								x 0.5=
8. Equipment								x 0.5=
9. Payment of Accounts								x 0.5=
(use back for additional comments)						**Overall Rating:**		

(Give explanation of items 1 through 9 on the following page in numerical order if overall rating is below 80%. Use additional sheets if necessary.)

_____ _____

District Construction Engineer's Signature/Date Resident Engineer's Signature/Date

_____

Contractor's Signature Acknowledging Report/Date

Contractor Requests Meeting with the District: No ☐ Yes ☐ Date Meeting Held: _____

Contractor's Comments/Meeting Notes (extra sheets may be added to this form and noted here if needed): _____

_____

_____

CONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

A deduction shall be recommended for unsatisfactory performance if computed overall rating is under 80%.
A deduction may be recommended for this project being completed late due to the Contractor's fault.

RECOMMENDATIONS FOR DEDUCTIONS FROM CONTRACTORS' ASSIGNED FACTOR
(*Write Yes or No in space provided*)

I recommend a deduction for Contractor's unsatisfactory performance: _____

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 9:_____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

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DOCUMENT 00440

Final Report ☐

Interim Report ☐

SUBCONTRACTOR PROJECT EVALUATION FORM

For instructions on using this form, see Engineering Directive E-10-002, Dated 4/20/2010

Date: _____

City/Town: _____ Subcontractor: _____

Project: _____ Address: _____

F.A. No.: _____ Contract Number: _____

Prime Contractor _____ Current Contract Completion Date: _____

Date Work Started: _____ Date Work Completed*: _____

Subcontractor's Superintendent: _____

Type of Work Performed by Subcontractor: _____

*If work was NOT completed within specified time (including extensions) give reasons on following page.

	Excellent 10	Very Good 9	Average 8	7	Fair 6	5	Poor 4	% Rating
1. Workmanship								x 2=
2. Safety								x 2=
3. Schedule								x 1.5=
4. Home Office Support								x 1.5=
5. Field Supervision/ Superintendent								x 1=
6. Contract Compliance								x 1=
7. Equipment								x 0.5=
8. Payment of Accounts								x 0.5=
(use back for additional comments)							**Overall Rating:**	

(Give explanation of items 1 through 8 on the following page in numerical order if overall rating is below 80%. Use additional sheets if necessary.)

_____ _____

District Construction Engineer's Signature/Date Resident Engineer's Signature/Date

_____ _____

Contractor Signature Acknowledging Report/Date Subcontractor Signature Acknowledging Report/Date

Subcontractor Requests Meeting with the District: No ☐ Yes ☐ Date Meeting Held: _____

Subcontractor's Comments / Meeting Notes (extra sheets may be added to this form and noted here if needed):

_____

_____

Contractor's Comments: _____

_____

SUBCONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

A deduction shall be recommended for unsatisfactory performance if computed overall rating is under 80%.
A deduction may be recommended for this project being completed late due to the Contractor's fault.

RECOMMENDATIONS FOR DEDUCTIONS FROM CONTRACTORS' ASSIGNED FACTOR
(*Write Yes or No in space provided*)

I recommend a deduction for Contractor's unsatisfactory performance: _____

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 8: _____

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WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

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Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00710
GENERAL CONTRACT PROVISIONS
Revised: 03-31-26

NOTICE OF AVAILABILITY

The STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES dated 2026, the SUPPLEMENTAL SPECIFICATIONS , the 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS; the 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING and the CONSTRUCTION STANDARD DETAILS are available online at https://www.mass.gov/massdot-highway-division-manuals-and-publications

SPECIAL PROVISIONS FOR RIGHT-TO-KNOW ACT REQUIREMENTS

The Contractor's attention is directed to Massachusetts General Laws, Chapter 111F, commonly known as the Right-To-Know Act, and to the regulations promulgated pursuant thereto. Among the provisions of the Right-To-Know Act is a requirement that employers make available to employees Materials Safety Data Sheets (MSDS) for any substance on the Massachusetts Substance List (MSL) to which employees are, have been, or may be exposed.

To ensure prompt compliance with these regulations and legislation, the Contractor shall:

1. Deliver to the Department, prior to the start of any work under this contract, copies of MSDS for all MSL substances to be used, stored, processed or manufactured at the worksite by the Contractor.

2. Train employees of the Department, who may be exposed to MSL substances as a result of the Contractor's work under this contract, with regard to those specific substances in accordance with requirements of the Right-To-Know Act.

3. Observe all safety precautions recommended on the MSDS for any MSL substance to be used, stored, processed, or manufactured at the worksite by the Contractor.

4. Inform the Department in writing regarding specific protective equipment recommended in the MSDS for MSL substances to which employees of the Department may be exposed as a result of the Contractor's work under this contract.

The Department shall not be liable for any delay or suspension of work caused by the refusal of its employees to perform any work due to the Contractor's failure to comply with the Right-To-Know Act. The Contractor agrees to hold the Department or the Commissioner of the Department harmless and fully indemnified for any and all claims, demands, fines, actions, complaints, and causes of action resulting from or arising out of the Contractor's failure to comply with the requirements of the Right-To-Know Act.

ALTERNATIVE DISPUTE RESOLUTION
Forum, Choice of Law and Mediations:

Any actions arising out of a contract shall be governed by the laws of Massachusetts and shall be brought and maintained in a State or federal court in Massachusetts which shall have exclusive jurisdiction thereof. MassDOT and the Contractor may both agree to mediation of any claim and will share the costs of such mediation pro rata based on the number of parties involved.

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DOCUMENT 00715

SUPPLEMENTAL SPECIFICATIONS

JUNE 30, 2026

The 2026 *Standard Specifications for Highways and Bridges* are amended by the following modifications, additions and deletions. These Supplemental Specifications prevail over those published in the Standard Specifications.

The Specifications Committee has issued these Supplemental Specifications for inclusion into each proposal until such time as they are updated or incorporated into the next Standard Specifications.

Contractors are cautioned that these Supplemental Specifications are dated and will change as they are updated.

DIVISION I

GENERAL REQUIREMENTS AND COVENANTS

SECTION 5.00: CONTROL OF WORK

Subsection 5.03: Conformity with Plans and Specifications
Change the MGL reference in the first sentence to Chapter 30, Section 39I (from Section 39L).

DIVISION II

CONSTRUCTION DETAILS

SECTION 200: DRAINAGE

SUBSECTION 227: DRAINAGE SYSTEM SEDIMENT

Subsection 227.30, Method of Measurement
Change the subsection number to 227.80

Subsection 227.31, Basis of Payment
Change the subsection number to 227.81

Subsection 227.31, Payment Items
Change the subsection number to 227.82

SECTION 400: SUB-BASE, BASE COURSE, SHOULDERS, PAVEMENT AND BERMS

SUBSECTION 430: CEMENT CONCRETE BASE COURSE

Subsection 430.40: General
Change Applied Crack Sealer to Hot Applied Crack Sealer.

SUBSECTION 476: CEMENT CONCRETE PAVEMENT

Subsection 476.20: Materials
Delete Preformed Bituminous Joint Filler for Concrete - M3.05.5 and add the following in M number sequence:

Preformed Expansion Joint Filler	M9.14.0

SUBSECTION 477: MILLED RUMBLE STRIPS

Subsection 477: Milled Rumble Strips
Replace this subsection with the following:

DESCRIPTION

477.20: General

The work consists of constructing rumble strips on roadways by milling grooves into finished surfaces. Milled Rumble Strips are categorized as Type A, Type B, Type C, or Type D. Type A are rectangular milled grooves at regular intervals in the paved surface, Type B rumble strips are rectangular grooves at regular intervals with designed gaps between intervals to accommodate bicyclists, and Type C and Type D rumble strips form continuous grooves in the paved surface in the form of a vertical sinusoidal wave pattern.

CONSTRUCTION METHODS

477.61: Equipment

The equipment shall self-align with the slope of the roadway surface and/or any irregularities in the roadway surface.

The Contractor shall demonstrate to the Engineer the ability to achieve the desired groove without tearing or snagging the roadway surface prior to beginning the work.

477.62: Installation of Rumble Strips

Rumble strips shall be installed in accordance with the locations, dimensions, and Type shown on the plans.

Type A and Type B rumble strips shall be installed after the longitudinal pavement markings they supplement (typically edge lines or channelizing lines) are in place. Installation of any diagonal or chevron pavement markings that cross the Type A or Type B rumble strips shall only occur after the rumble strips are in place.

Type C rumble strips shall be installed after the location of the longitudinal pavement markings they supplement (typically center lines) has been laid out, but before the pavement markings are installed. The pavement markings shall only be installed after the Type C rumble strips are in place.

Type D rumble strips shall be installed after the longitudinal pavement markings they supplement (typically center lines) are in place.

477.63: Control of the Work Area

At the end of each working day, all equipment shall be moved to a location where it does not present a hazard to traffic. The pavement shall be cleaned by sweeping and the work area shall be reopened to traffic.

Pavement millings shall become the property of the Contractor and shall be removed and disposed of off-site.

COMPENSATION

477.80: Method of Measurement

Milled Rumble Strip (Type A), Milled Rumble Strip (Type C), and Milled Rumble Strip (Type D) will be measured by the total length of installed rumble strip. Milled Rumble Strip (Type B) will be measured by the total length of installed rumble strip excluding the designed gaps. Breaks at castings, bridge decks, intersections or other breaks will not be measured for payment for all types.

477.81: Basis of Payment

Payment for Milled Rumble Strip (Type A), Milled Rumble Strip (Type B), Milled Rumble Strip (Type C), and Milled Rumble Strip (Type D) will be made at the contract unit price per foot of rumble strips, complete in place. Such payment will be full compensation for furnishing all equipment and labor for satisfactorily performing the work including cleanup and disposal of excess materials.

477.82: Payment Items

Item number	Description	Unit
477.	Milled Rumble Strip (Type A)	Foot
477.1	Milled Rumble Strip (Type B)	Foot
477.2	Milled Rumble Strip (Type C)	Foot
477.3	Milled Rumble Strip (Type D)	Foot

SUBSECTION 482: SAWCUTTING

Subsection 482.80: Method of Measurement
Replace this subsection with the following:

Sawcutting, when included in the Contract as its own bid item, will be measured for payment by the foot along the cut line, regardless of depth.

SECTION 600: HIGHWAY GUARD, FENCES AND WALLS

SUBSECTION 628: IMPACT ATTENUATORS

Subsection 628.82: Payment Items
Replace this subsection with the following:

Item number	Description	Unit
628.302	Permanent Impact Attenuator, Non-Redirective, TL-2	Each
628.303	Permanent Impact Attenuator, Non-Redirective, TL-3	Each
628.304	Temporary Impact Attenuator, Non-Redirective, TL-2	Each
628.305	Temporary Impact Attenuator, Non-Redirective, TL-3	Each
628.312	Permanent Impact Attenuator, Redirective, TL-2	Each
628.313	Permanent Impact Attenuator, Redirective, TL-3	Each
628.314	Temporary Impact Attenuator, Redirective, TL-2	Each
628.315	Temporary Impact Attenuator, Redirective, TL-3	Each
628.322	Permanent Impact Attenuator, Low-Maintenance, TL-2	Each
628.323	Permanent Impact Attenuator, Low-Maintenance, TL-3	Each

SECTION 800: TRAFFIC CONTROL DEVICES

SUBSECTION 813: WIRING, GROUNDING AND SERVICE CONNECTIONS

Subsection 813.20: General
Replace this subsection with the following:

This work shall consist of furnishing and installing wire and cable of the type and size indicated for traffic signals and other traffic control devices, ITS systems, highway lighting and related electrical systems, equipment grounding systems, new ground electrodes or connections to existing ground electrodes, power pedestals, and all materials and equipment necessary to deliver power to such systems.

Service points shown on the plans are approximate only. The Contractor shall determine exact locations for both overhead and underground service access points. The Contractor shall determine riser elevations or connections/routing to manhole facilities from the serving utility, and arrange to complete the service connections.

All work under this Subsection shall comply with the MEC and the National Electrical Safety Code.

Subsection 813.41: Grounding and Bonding Conductions
Replace this subsection with the following:

Grounding and bonding conductors shall conform to M8.16.10: Type 10 Grounding and Bonding Conductors (Solid or Stranded, Insulated or Bare).

Subsection 813.42: Ground Rods
Replace this subsection with the following:

Ground rods shall consist of driven rod(s) conforming to M8.17.0: Ground Rod or other devices approved for the purpose.

Subsection 813.44: Power Pedestal
Add this subsection in numerical order:

A Power Pedestals shall consist of a side-of-post mounted lockable load center enclosure, a load center with circuit breakers, an exterior-mounted electrical meter, signal post and base, equipment bonding, ground rod(s) conforming to 813.42: Ground Rods, and a cement concrete foundation. The enclosure, lock, circuit breakers, signal post and base, and foundation shall all be included in the Shop Drawing submission.

The enclosure shall be rated to meet or exceed NEMA 3R and be suitable for post-mounting and shall be sized appropriately to house the load center. The enclosure shall be capable of being secured with an integrated locking mechanism or by a Contractor-supplied padlock; regardless of locking mechanism, it shall be operated with a #2 key.

The circuit breakers shall be designed for single-phase, 3-wire, 120/240 VAC. Circuit breakers shall provide a means to manually operate a circuit and/or automatically open a circuit that is in overload or short circuit conditions. All circuit breakers shall be UL listed and have CSA certification.

The enclosure shall be furnished with a meter socket installed. The meter socket shall be approved by the servicing electrical utility.

The signal post and base shall conform to M10.05.1: Signal Posts and Bases and the Plans. The Contractor shall supply a square aluminum base with a natural or anodized finish and a Schedule 80 aluminum post with a brushed or spun finish, unless otherwise indicated in the Plans.

The Contractor shall supply mounting equipment recommended by the enclosure manufacturer to side-mount the cabinet to the post.

Bonding for the Power Pedestal shall utilize a #8 AWG or larger ASTM-B3 wire.

The cement concrete foundation shall conform to the Plans and M4.02.0: Concrete Produced by Stationary and Truck Mixers, M4.03.0: Concrete Produced by Volumetric Mixers, M4.06.1: Conventional Concrete, M4.09.0: Precast, Prestressed, and Prefabricated Concrete Products, M4.11.0: Evaporation Reducing Materials, and M4.12.0: Curing Materials, as applicable.

Subsection 813.64: Power Pedestal
Add this subsection in numerical order:

No work shall commence until Shop Drawings have been approved.

The Power Pedestal Cabinet shall be mounted side-of-post to the Signal Post, per the manufacturer's recommendations. The Power Pedestal Cabinet should be installed directly below the meter socket, per the Plans. If dissimilar metals are present, they shall be electrically insulated to prevent galvanic corrosion.

The Contractor shall supply the appropriate type (single pole or double pole) and number of circuit breakers included within the Power Pedestal Cabinet to provide the recommended AC power to each device receiving power from the Cabinet. The circuit breakers shall be clearly labeled as to which device they are powering (e.g. RRFB-1, RRFB-2, Warning Beacon, Speed Feedback Sign, etc.).

The Power Pedestal shall be grounded and bonded per 813.61: Equipment Grounding and Bonding and 813.62: Grounding Electrodes.

Subsection 813.80.E: Power Pedestal
Add this subsection in numerical order:

Power Pedestals will be measured by the number of Power Pedestals each furnished and installed.

Subsection 813.81.E: Power Pedestal
Add this subsection in numerical order:

Power Pedestals will be paid for at the contract unit price for each installed in place. This includes all labor and materials required for a working system.

All costs associated with grounding and bonding of Power Pedestals shall be considered incidental to the item.

All costs associated with providing service connections to Power Pedestals shall be paid for under their respective pay items.

Subsection 813.82: Payment Items
Change the unit of measure for items 813.80 and 813.81 to Each and add the following pay item:

Subsection 815.82: Payment Items
Delete payment items 818.90 to 818.94, 819.39, 819.832, 819.52, 819.53, 819.60 to 819.64, 819.70, 819.71, 819.72, 819.800, 819.801, 819.802, 819.803,:819.810, 819.811, 819.820, 819.821, 819.850, 819.851, 819.852.

Add the following payment item:

813.90	Power Pedestal	Each

SUBSECTION 819: TRAFFIC SIGNAL DETECTION

Subsection 819: Traffic Signal Detection
Add this subsection:

DESCRIPTION

819.20: General

Work under this Subsection consists of furnishing and installing detection devices for vehicles, bicycles, pedestrians, and other road users.

MATERIALS

819.40: General

Materials shall meet the requirements specified in the following Subsections of Division III, Materials:

Material	Section
Vehicle Detection Systems	M10.08.0
Passive Stop Line Detectors	M10.08.1
Passive Advanced Detectors	M10.08.2
Pedestrian Detectors	M10.09.0
Pedestrian Pushbutton Assembly	M10.09.1
APS Pushbutton Assembly	M10.09.2

The Contractor shall furnish Vehicle Detection Systems (VDS) and Pedestrian Detectors that are listed on the QTCE.

Any software, firmware, cables, or adapters required to program, adjust, fine-tune, or monitor VDS or Pedestrian Detectors shall be provided by the Contractor. VDS and Pedestrian Detectors shall have the latest versions of software and/or firmware installed prior to inspection. Manufacturer updates to software and/or firmware shall be included at no cost for the life of the products.

819.40.A: Vehicle Detection Systems

A VDS shall consist of one or more Internet Protocol (IP) -based detector/sensor assemblies and a cabinet interface device that is installed in a Traffic Signal Controller Cabinet or similar device.

Stop Line VDS shall be capable of providing motor vehicle and bicycle detection at all locations shown on the Plans. The Contractor may furnish a VDS that utilizes a single detector/sensor or multiple, as long as all stop line motor vehicle and bicycle detection zones are encompassed and the traffic signal or other device utilizing the detection can operate per the Plans. All Passive Stop Line Detectors required to provide stop line detection at an intersection shall be included in the cost of a single Stop Line Vehicle Detection System.

If the Contractor furnishes a Stop Line VDS that does not utilize an integrated video monitoring system, a separate video monitoring system per 819.41: Video Monitoring System shall be furnished and installed at no additional cost.

Advanced VDS shall be capable of providing motor vehicle detection on a single approach, at the location shown on the Plans. The Contractor Shall furnish Passive Advanced Detectors that utilize, and are compatible with, the same interface device installed in the Traffic Signal Controller Cabinet, or similar device, as the Stop Line VDS.

All VDSs shall be furnished with manufacturer-supplied mounting hardware.

If multiple VDSs over multiple locations are supplied under a single contract, all components furnished by the Contractor shall be of the same make and model.

819.40.B: Pedestrian Detectors

Pedestrian Pushbutton Assembly and Accessible Pedestrian Signal (APS) Pushbutton Assembly shall both include a pushbutton, sign, housing, manufacturer-specified mounting hardware, and wiring. The Contractor shall review the Contract Documents to determine if one or more in-cabinet control units are required to meet the pedestrian detector type and operational requirements. In-cabinet control units shall be considered incidental to the cost of the item.

The Contractor shall provide a pushbutton housing that conforms to the shape of the pole it is mounted to or shall furnish and install a manufacturer-supplied saddle to provide a flush, secure fit, at no additional cost.

An APS Pushbutton Assembly shall include a pedestrian pushbutton sign that conforms to the Plans. If the sign is not integral to the housing, separate mounting equipment shall be furnished and installed by the Contractor. All costs associated with the sign and mounting equipment shall be considered incidental to the cost of the item.

819.41: Video Monitoring System

When required by 819.40.A: Vehicle Detection Systems, the Contractor shall furnish and install a Video Monitoring System. The Video Monitoring System shall consist of one or more IP-based 4K, 1080p, H.264 dome-type CCTV cameras; mounting hardware, including but not limited to: brackets, bands, straps, posts, plates, and pole mount adapters; power distribution and conditioning equipment including surge suppression; and all necessary cabling and wiring.

All equipment provided for the Video Monitoring System shall be commercial, off-the-shelf products. Custom equipment designed specifically for the Contract will not be accepted. All cabling and wiring shall be recommended by the manufacturer and rated for outdoor use. Any special wiring or connectors required by the manufacturer shall be identified in the Shop Drawings.

The Video Monitoring System shall conform to National Electrical Manufactures Association (NEMA) standards, Underwriters' Laboratory (UL), and Military Standards (MIL), as applicable. All components of the Video Monitoring System shall be new and still under production by the manufacturer. Obsolete, no longer produced, and/or no longer supported components will not be accepted.

The Video Monitoring System shall be capable of operating in temperatures ranging from -29°F to +165°F.

The camera shall meet or exceed the requirements found in Table 819.41-1:

Table 819.41-1: Minimum Camera Requirements

Feature	Requirement
Zoom Ratio	The minimum zoom ratio shall be 30x Optical and 12x Digital
Camera Type	The camera shall be an IP-type CCTV camera.
Auto Focus	The camera shall include auto focus with a selection for manual override of auto focus.
Lens Aperture Ratio	Typical: F/1.6 to F/4.7 (wide to telephoto)
On-Screen Direction	The CCTV camera shall display on-screen azimuth indications.
Privacy Zones	The CCTV camera shall be programmable to blank out up to 8, four-sided areas to electronically block portions of the camera's field of view from being

Feature	Requirement
	displayed. These privacy zones shall move and adjust sizing synchronously with camera movements and degree of lens zooming.
On-Screen Labels, Text and Titles	The CCTV camera shall display a minimum of 20 programmable characters for on-screen camera ID, preset position, sector, and alarm titles.
On-Screen Labels, Text and Title Positioning	The position of the on-screen text shall be adjustable to appear at selectable positions on the CCTV camera screen image.
Number of Pixels	The camera shall provide a minimum of 1280H x 720V effective pixels. The camera shall be capable of being configured to operate at all standard lower resolutions down to 320H x 180V effective pixels.
Image Sensor Size	The camera shall include an image sensor of 1/1.8 in., nominal.
Lens Focal Length	The camera shall include a zoom lens of 4.3 mm to 129 mm, minimum focal length.
Color and Black & White Image Selection	The camera shall have Color and Black & White video image display modes incorporating both automatic and manual override image mode selection. The camera shall transition automatically to a Black & White mode (when in automatic mode) when the luminance level reaches a user predefined threshold. At all times the camera shall provide a full motion video output at 30 frames per second.
Image Stabilization	The CCTV camera shall incorporate electronic image stabilization to reduce the effects of vibration and wind gusts on the displayed video image.
Automatic Iris	The camera shall include both automatic iris control and an override for manual iris adjustments.
Wide Dynamic Range	The CCTV camera's wide dynamic range shall be 120 dB.
CCTV Camera Optical Sensitivity	The camera's sensitivity shall be sufficient to provide a clear, usable color video image display with a scene illumination of ≤ 0.1 lux at an aperture of F1.6, nominal.
Power Input	The power input for the CCTV camera and dome shall be PoE+.
Alarms	No alarm contacts shall be wired.

The Contractor shall mount the camera at a location that optimizes line-of-sight for all approaches. The view of each approach shall have a clear line of sight, free from obstructions from trees, overhead wires, buildings, and/or other obstructions. If the Contractor is unable to provide a clear line of sight for all approaches to the satisfaction of the Engineer, a second camera, including mounting hardware, cabling, and wiring, shall be furnished and installed on a different traffic signal structure at no additional cost.

The Contractor shall be responsible for the following items prior to installation:

- Ensure that all components are assembled and factory-tested prior to delivery to the project site.
- Fully configure the camera settings, including but not limited to: camera resolution, camera address, default settings, and pre-set and home positions, per the direction of the Engineer.
- Coordinate with the Engineer to set the camera address number to provide unique identification that is compatible with the CCTV camera addressing schema utilized by the Department.

The Contractor shall deliver the camera(s) fully assembled to the project site.

The Contractor shall provide up to 3 hard copy sets of operating manuals, service manuals, and maintenance instructions for all components of the system. At the request of the Engineer, the number of copies may be reduced if the manuals are provided in .pdf file format.

819.42: Material Warranties

All components of Vehicle Detection Systems, including Video Monitoring Systems, and Pedestrian Detectors shall include a minimum two-year manufacturer's replacement warranty that will commence upon acceptance by the Engineer. The warranty shall cover any manufacturing defects of the products.

Construction Methods

819.60: General

The Contractor shall use discretion in installing the detectors/sensors at locations that optimize the performance of the VDS and to eliminate false calls. The Contractor shall notify the Engineer if the size or location of the detection zones differs from what is shown in the Plans. At the direction of the Engineer, the Contractor will be required to readjust the location of the detection zones and/or modify the detection channels if false calls are observed or the traffic signal system is not operating per the Plans due to the performance of the VDS; this work shall be considered incidental to the cost of the item.

The Contractor shall use manufacturer-specified mounting hardware for all detectors/sensors. If mounted to mast arms or strain poles, any addition weight or wind loading from the detector/sensor shall be accounted for in the structural calculations.

The Contractor shall install the cabinet interface device in the traffic signal controller cabinet. The cabinet interface device shall be connected to the Field Monitoring Unit (FMU) or an ethernet switch in the traffic signal controller cabinet. All communication between devices shall be IP-based. Use of external communications that are not routed through the FMU is prohibited.

The Contractor shall furnish and install low voltage power cabling surge protection equipment required for all data and power lines associated with VDS, Video Monitoring Systems, and/or Pedestrian Detection Systems entering the traffic signal controller cabinet.

The Contractor shall install the manufacturer-specified cable between the detectors/sensors to the cabinet interface device in the traffic signal controller cabinet via traffic signal structures, conduit, and/or pullboxes. This shall include all connectors, sealing tape, and incidental work to complete the connection(s). All equipment installation and wiring shall be installed in a neat and orderly manner and per the manufacturer's specifications.

The VDS shall be powered through one of the power outlets available on the FMU. The VDS shall be capable of being powered down and remotely restarted through remote control of the power outlet on the FMU.

Under the supervision of the Engineer, the Contractor shall install the VDS software that allows visual confirmation of the detection zones on Department computers.

The Contractor shall install Pedestrian Detectors at the location(s) and mounting height shown on the Plans.

The Contractor shall mount and orient the APS Pushbutton Assembly in a manner so that the vibrotactile arrow is aligned parallel to the crosswalk.

Prior to acceptance, the Contractor shall furnish all passwords for Vehicle Detection Systems and Pedestrian Detectors to the Engineer. The use of default passwords is prohibited.

819.61: Programming APS Pushbuttons

Each APS Pushbutton shall have an audible walk indication during the associated walk interval. The duration of the audible walk indication shall match the duration of the walk interval unless the pedestrian signal is programmed to rest in walk. If programmed to rest in walk, the audible walk indication shall be limited to 7 seconds in length but may be recalled by a subsequent button press during the walk interval.

The APS Pushbutton locator tone and audible walk indication shall be programmed to broadcast at volume 5 dBA louder than ambient sound, except when audible beaconing is provided in response to an extended pushbutton press. The broadcast volume shall be programmed to not exceed 100 dBA at 3 ft. from the emitter, regardless of ambient noise conditions.

The locator tone shall have a duration of 0.15 seconds or less and shall repeat at 1-second intervals.

The locator tone shall be active during all signal intervals, except for the following conditions:

- When the audible walk indication is being broadcast.
- If the signal is programmed to rest in walk, the locator tone shall resume 7 seconds after the start of the walk interval.
- The locator tone shall be disabled if the traffic control signal or pedestrian hybrid beacon is operating in an emergency or fault flashing mode.

The locator tone shall be active during the flashing yellow and alternating flashing red intervals of a pedestrian hybrid beacon phasing sequence.

Upon button press, the locator tone at that pushbutton shall be interrupted and a speech message of “Wait” shall be broadcast.

The normal status of the pilot light shall be dark. The pilot light shall illuminate upon button press and stay illuminated until the start of the walk interval, when it shall return to dark. If the associated pedestrian phase is set to pedestrian recall, the pilot light shall stay illuminated for all intervals except for the walk interval.

The audible walk indication shall an audible tone unless a speech message is called for in the Plans. The audible tone shall repeat at 8 to 10 ticks per second, in multiple frequencies, with the dominant component at 880 Hz.

If a speech message is used, the following shall apply:

- For exclusive pedestrian phases, during the walk interval the speech message shall be: “walk sign is on for all crossings.” This message shall be broadcast a single instance.
- *For concurrent pedestrian phases, during the walk interval the speech message shall be: “[STREET NAME]. Walk sign is on for [STREET NAME].” This message shall be broadcast a single instance.
- If the signal is programmed to rest in walk, the concurrent pedestrian speech message shall be repeated upon each subsequent button press.

*Note: See Plans for Street Name information.

The vibrotactile arrow shall vibrate during the walk interval.

The Contractor shall include a fault relay that will default to placing a constant pedestrian call from any pushbutton assembly that fails to communicate back to the in-cabinet control unit.

The Contractor shall connect the in-cabinet control unit to the Field Monitoring Unit (FMU) via an open ethernet port.

819.62: VDS Testing and Evaluation

After the VDS is installed, but prior to acceptance, the Contractor shall conduct an evaluation of the system in the presence of the Engineer. The purpose of the evaluation is to certify the system is operating per the requirements of M10.08.0: Vehicle Detection Systems, M10.08.1: Passive Stop Line Detectors, and M10.08.2: Passive Advanced Detectors, as applicable. The Contractor shall submit their testing and evaluation plan as a part of the Shop Drawing submittal.

The testing and evaluation shall take place for a minimum of 30 minutes under moderate live traffic conditions. Testing shall not be conducted during inclement weather.

If the Engineer determines that the system does not meet the operational requirements, the Contractor will be required to adjust the location, orientation, and/or number of detector/sensors. The Contractor may also adjust the location of the detection zones at this time. Upon completion of this work, the system shall be reevaluated in the presence of the Engineer. This process shall be repeated until the operational requirements are met.

All costs associated with testing and evaluation of the VDS, including the repositioning or addition of new materials, shall be considered incidental to the item.

Compensation

819.80: Method of Measurement

Stop Line Vehicle Detection Systems will be measured as each system furnished and installed.

Advanced Vehicle Detection Systems will be measured as each system furnished and installed.

Pedestrian Pushbuttons and APS Pushbuttons will be measured as each pushbutton furnished and installed.

819.81: Basis of Payment

Stop Line Vehicle Detection Systems will be paid for each system installed at an intersection. For the purposes of this work, an intersection shall be defined as all roadway, path, and/or trail approaches controlled by a single traffic signal controller. Where a Video Monitoring System is required per 819.40: General, it shall be included in the cost of Item 819.840.

Advanced Vehicle Detection System will be paid for each system installed on an intersection approach.

Pedestrian Pushbutton and APS Pushbutton will be paid for each pushbutton assembly installed. The pedestrian sign mounted directly above the pushbutton shall be considered incidental to the item.

The unit cost of each vehicle detection system or pushbutton item shall include all wiring, cabling, mounting hardware, software, firmware, video monitoring system (if required), testing, calibrating, Department Acceptance, training, and all other labor and materials required for the system(s) to operate per the Plans.

819.82: Payment Items

Item number	Description	Unit
819.840	Stop Line Vehicle Detection System	Each
819.845	Advanced Vehicle Detection System	Each
819.850	Pedestrian Pushbutton	Each
819.855	APS Pushbutton	Each

SUBSECTION 850: TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS

Subsection 850.25: Arrow Board
Subsection 850.45: Arrow Board
Subsection 850.65: Arrow Board
Delete these subsections.

Subsection 850.80: Method of Measurement
Delete the 7th paragraph beginning with "Arrow Board will be measured …"

Subsection 850.81: Basis of Payment
Delete the 7th paragraph beginning with "Arrow Board will be paid for …"

Subsection 850.82: Payment Items
Revise description and unit of item 852. to Safety Signing for Traffic Management / Square Foot.
Delete item number 856.

SUBSECTION 856: CONNECTED WORK ZONE NOTIFICATION SYSTEM AND ASSOCIATED DEVICES

Subsection 856: Connected Work Zone Notification System and Associated Devices
Add this new subsection.

DESCRIPTION

856.20: General

The Connected Work Zone Notification System (CWZNS) is a system of field devices that transmit real-time location-based data about work zones. CWZNS field device data is provided in a Work Zone Data Exchange (WZDx) Device Feed in accordance with the United States Department of Transportation (USDOT) WZDx Specification. The Device Feed is consumed by the MassDOT Work Zone Manager (WZM) application.

The Contractor shall be responsible for furnishing, installing, repositioning, operating, maintaining, and removing these CWZNS devices.

MATERIALS

856.40: General

Materials shall meet the requirements specified in the following Subsections of Division III, Materials:

Material	Section
Connected Work Zone Notification System Devices	M10.18.0
Location Marker	M10.18.1
Connected Arrow Board	M10.18.2

End Location Markers shall conform to M10.18.1: Location Marker and include power and communication status lights and an on/off switch.

856.41: Arrow Board

Arrow Boards shall consist of a matrix of yellow elements that may be illuminated in flashing or sequential patterns, on a non-reflective, black background. The light output from the Arrow Board shall meet the minimum legibility distance, per the MUTCD. The elements shall be capable of at least 50% dimming from full brilliance to avoid nighttime glare. Arrow Boards that are continuously operational in both daylight and nighttime conditions shall automatically adjust the light output based upon ambient light conditions.

The mounting height of the Arrow Board, when in operation, shall be per the Plans.

The minimum dimensions and number of elements for Arrow Boards shall be per Table 856.41-1.

Table 856.41-1: Arrow Board Dimensions and Elements

Item Numbers	MUTCD Type	Minimum Dimensions (width by height)	Minimum Number of Elements
856.060, 856.160	B	60 in. by 30 in.	13
856.096, 856.196	C	96 in. by 48 in.	15

Arrow Boards shall be capable of the following operating modes, per the MUTCD:

- Four Corners Flashing Caution
- Alternating Diamond Caution
- Flashing Arrow (left or right)
- Sequential Chevron (left or right)
- Flashing Double Arrow

Arrow Boards that are categorized as "Connected Arrow Boards" (Items 856.160 and 856.196) shall meet the requirements of M10.18.2: Connected Arrow Board in addition to the requirements of an Arrow Board described in this Subsection.

856.42: Shop Drawings

Within 30 days of the Notice to Proceed, the Contractor shall submit to the Engineer for review and approval cut sheets for each model of CWZNS device to be used. The cut sheets shall document device specifications, including details of how the CWZNS device will communicate. Work that requires the use of CWZNS devices shall not commence until the submission has been approved.

CONSTRUCTION METHODS

856.60: General

At least 15 days prior to deploying CWZNS devices, the Contractor shall visit the site to verify cellular coverage. If the devices the Contractor plans to deploy do not have coverage, the Contractor shall swap out the cellular modem, SIM card, or both to a carrier that provides coverage. If no adequate cellular coverage exists from 4G LTE or 5G providers, the Contractor shall immediately notify the Engineer.

The Contractor shall install CWZNS devices at the locations shown on the Plans.

Per the WZDx Specification Device Feed, an End Location Marker shall have a single MarkedLocation with the "type" property as "work-zone-end".

The Contractor shall install and power on the End Location Marker coinciding with the deployment of the temporary traffic control setup that calls for its use. The Contractor shall power down and remove the Location Marker at the conclusion of the removal of the temporary traffic control setup. If the location of the work moves during a work shift, the Contractor shall power down the Location Marker, relocate it, and then power it back on.

The operating mode for the Arrow Board or Connected Arrow Board shall be per the Plans. When activated, the minimum element on-time shall be 50% for the flashing mode, with equal intervals of 25% for each sequential phase. The flashing rate shall be not less than 25 or more than 40 flashes per minute.

If a Connected Arrow Board is being used to transmit its location without utilizing other arrow board functions, such as operating a Flashing Arrow, the arrow board shall remain dark and removed from the roadway or protected from approaching traffic while the data is being transmitted.

The Contractor shall be responsible for remediating any CWZNS device that is not operating as specified, at no additional cost to the Department.

CWZNS devices that are lost, stolen, vandalized, damaged, destroyed, or deemed unacceptable while their use is required on the project shall be replaced by the Contractor at no additional cost to the Department.

COMPENSATION

856.80: Method of Measurement

Arrow Boards and Connected Arrow Boards will be measured by the Day. Each period of up to 24 hours during which an Arrow Board or Connected Arrow Board is in use will be measured as one day, regardless of the number of times that the unit is positioned, repositioned, removed, or returned to service.

End Location Markers will be measured by the Day. Each period of up to 24 hours during which a End Location Marker is in use will be measured as one day, regardless of the number of times that the unit is positioned, repositioned, removed, or returned to service.

856.81: Basis of Payment

Arrow Boards and Connected Arrow Boards will be paid for at the contract unit price per day which shall include full compensation for labor and materials, positioning, repositioning, and removing or returning to service.

End Location Markers will be paid for at the contract unit price per day which shall include full compensation for labor and materials, positioning, repositioning, and removing or returning to service.

If an End Location Marker is attached to another traffic control device that is not otherwise called for in the Plans or Specifications, that ancillary device shall be considered incidental to the cost of the End Location Marker.

Licenses, fees, communication costs, power costs, and access to real-time and recorded data associated with the Device Feed for CWZNS devices shall be considered incidental to the cost of the item.

The Department will not pay for CWZNS devices that fail to operate as specified.

856.82: Payment Items

Item number	Description	Unit
856.060	Arrow Board (Type B)	Day
856.096	Arrow Board (Type C)	Day
856.160	Connected Arrow Board (Type B)	Day
856.196	Connected Arrow Board (Type C)	Day
856.201	End Location Marker	Day

SECTION 900: STRUCTURES

SUBSECTION 901: CEMENT CONCRETE

Subsection 901.20: Materials

Delete Asphaltic Materials – M3, Preformed Bituminous Fiber Joint Filler – M3.05.3 and add the following in M number sequence:

Preformed Expansion Joint Filler	M9.14.0

SUBSECTION 983: REVETMENT

Subsection 983.40: General
Delete Preformed Bituminous Fiber Joint Filler – M3.05.3 and add the following in M number sequence:

Preformed Expansion Joint Filler	M9.14.0

DIVISION III

MATERIALS SPECIFICATIONS

SECTION M3: ASPHALTIC MATERIALS

Subsection M3.05.5: Preformed Bituminous Joint Filler for Concrete
Delete this subsection.

SECTION M9: MISCELLANEOUS MATERIALS

Subsection M9.14.0: Preformed Expansion Joint Filler
Replace this subsection with the following:

Preformed expansion joint filler for concrete applications and structural construction shall meet the requirements specified herein. The Contractor shall provide certified test data which documents compliance with the required physical properties. The certified test data shall be submitted to the Engineer for approval.

Table M9.14.0-1: Types of Preformed Expansion Joint Filler

Specification	Type and Description
AASHTO M 153	Type I – Sponge Rubber Type II – Cork Type III – Self-Expanding Cork Type IV – Polyurethane-Bonded Recycled Rubber
AASHTO M 213	Type I – Asphalt-Saturated Cellulosic Fiber Type II – Asphalt Binder-Cork with Asphalt-Saturated or Glass Fiber Felt Type III – Polyurethane-Bonded Recycled Rubber
ASTM D1752	Type IV – Recycled PVC
ASTM D7174	Type I – Closed-Cell Polyethylene or Blended Polyethylene Foam
ASTM D8139	Type I – Closed-Cell Polypropylene Foam

Subsection M9.14.2: Closed Cell Foam Joint Filler
Delete this subsection:

M10.03.1: Field Monitoring Unit

All Field Monitoring Units (FMU) shall be compatible with the MassDOT Critical Operations Multi-jurisdictional Modular System (MCOMMS), cloud-based management system.

Subsection M9.14.2: Closed Cell Foam Joint Filler
Delete this subsection:

SECTION M10: TRAFFIC CONTROL DEVICES

Subsection M10.03.1: Field Monitoring Unit
Add these new subsections:

M10.03.1: Field Monitoring Unit

All Field Monitoring Units (FMU) shall be compatible with the MassDOT Critical Operations Multi-jurisdictional Modular System (MCOMMS), cloud-based management system.

FMUs shall be capable of operating independently from the brand of traffic signal controller, vehicle and pedestrian detection systems, battery backup system (BBS), and any other Ethernet-based, web accessible device present in the traffic signal controller cabinet.

M10.03.1.A: Hardware

The FMU shall communicate via an Ethernet port with an RJ45 connector and have an integrated Ethernet switch with a minimum of four ports.

The FMU shall be powered via standard 120 VAC input power. The FMU shall include an integrated battery and battery charging/monitoring circuit that will allow the FMU to fully function even if all other electrical service to the cabinet has been interrupted. The battery shall continue to supply the FMU with power for a minimum of 5 hours on a single charge.

The FMU shall have an integrated GPS that will allow for automated telemetry without additional configuration. The GPS shall be capable of providing a time sync pulse to the internal clock of a connected traffic signal controller. The FMU shall utilize the integrated GPS to geolocate itself on a map via the FMU management software.

M10.03.1.B: Software

The configuration of the FMU shall be accomplished by accessing FMU management software via an internet browser. It shall be possible to configure the FMU without any special software.

The FMU shall operate without requiring a static IP address. The only configuration required at the FMU is to enter the URL to the host of the FMU management software.

The FMU shall utilize HTTPS protocols and XML data structure for communications with the FMU management software. The data shall be scalable for future expansion; proprietary protocols shall not be used.

M10.03.1.C: Wireless Connectivity

The FMU shall be supplied with an internal 4G LTE cellular modem.

The modem shall support future upgrades to 5G service, when available, and shall be compatible with SIM cards from multiple cellular carriers.

M10.03.1.D: Remote Access

Remote access to any traffic signal cabinet component that has a web interface via the FMU shall not require the end user to create a separate Virtual Private Network (VPN) connection.

Subsection M10.08.0: Vehicle Detection Systems
Subsection M10.08.0: Vehicle Detection Systems
Subsection M10.08.0: Vehicle Detection Systems
Add theses new subsections:

M10.08.0: Vehicle Detection Systems

Vehicle Detection Systems (VDS) shall be capable of detecting the presence of all motor vehicle types and bicycles in designated areas and sending corresponding detector outputs to a traffic signal controller.

All in-cabinet components of VDS shall be compatible with the following standards:

- ATCC 5301 v02
- ATC 5201 v06
- NEMA TS2 environmental standards

Through an ethernet-based connection to the detection module and/or cabinet interface device in the field or through the internal network of the traffic signal controller cabinet, the VDS shall support remote management of motor vehicle and bicycle detection configurations and access to data including:

- The number, location, and size of detection zones.
- Configuration of the detector channel and assigned phase for each zone.
- Configuration of detection zones for signal performance measurement data collection.
- The ability to add and remove users.
- Signal performance data:
  - Monitoring and recording the status of the phase and detector channels from the traffic signal controller through the SIU bus at a frequency of no less than 10 times per second.
  - Estimation of the speed of vehicles at defined, user-configurable points, such as entering or exiting a detection zone.
  - Retrieval of the signal performance data through an http-based Application Programming Interface (API), or equivalent process, in .xml, .json, or .csv format.
  - The data shall be available in a per vehicle format, be viewable in real time, and store at least 168 hours of data locally on the device.

VDS shall be capable of supporting user-based restrictions to limit functionality, including:

- The ability to make changes to the VDS settings.
- The ability to view imagery or digital video streams.
- The ability to view and download signal performance data.

VDS shall be capable of automatically determining if the system's ability to accurately detect vehicles and shall default to a constant call state if this system error is detected.

VDS shall be capable of classifying vehicles based upon length and/or number of axles.

VDS shall be capable of performing all detection, classification, and data collection functions in the absence of an internet connection.

VDS shall be capable of providing remote access to the latest images or digital video stream of all IP video units through either an HTTP request or through a Real Time Streaming Protocol compatible with RFC2326 standards. VDS that do not utilize video shall be able to display the current state of the vehicle detection zones and approximate vehicle locations in a digital twin model of the intersection.

M10.08.1: Passive Stop Line Detectors

Passive Stop Line Detectors shall demonstrate a reliability of 99% or greater for vehicle detection functions.

Passive Stop Line Detectors shall be able to track and classify turning movements for all motor vehicle types and bicycles and shall demonstrate an accuracy of 95% or greater for turning movement counts.

M10.08.2: Passive Advanced Detectors

Passive Advanced Detectors shall be capable of detecting all motor vehicle types at a minimum distance of 600 ft upstream of the stop line.

Subsection M10.09.0: Pedestrian Detectors
Subsection M10.09.1: Pedestrian Pushbutton Assembly
Subsection M10.09.2: APS Pushbutton Assembly
Add theses new subsections:

M10.09.0: Pedestrian Detectors

Pedestrian Detectors shall be capable of detecting the presence of pedestrians and placing a corresponding call for a phase in a traffic signal controller or similar device.

Pedestrian Detectors may be pushbuttons or passive detection devices.

Components of Pedestrian Detectors shall meet NEMA TS2 compliance for temperature and humidity, mechanical shock and vibration, transient voltage protection, transient suppression, and electrical reliability.

If Pedestrian Detectors include an in-cabinet control unit, it shall meet the following requirements:

- Operate on a cabinet-supplied 120 VAC power source.
- Include labelled LED indicators for each channel operation.
- Include a 10/100BaseT, RJ45 ethernet connector port.
- Capable of communication with the Pedestrian Detectors to allow for remote programming and firmware updates via the ethernet connection.
- Capable of supporting a minimum of 4 pedestrian detectors per NEMA pedestrian phase and up to 16 pushbuttons.
- Will automatically reset upon loss of internal communication.

M10.09.1: Pedestrian Pushbutton Assembly

A Pedestrian Pushbutton Assembly shall consist of a pushbutton, a sign, and a housing to mount those devices to a post.

The pushbutton shall be a minimum of 2 in. in diameter and the force to activate it shall be no greater than 5 lbs. The pushbutton must be weather-tight and tamper-resistant.

The pushbutton shall meet one of the following criteria:

- A normally open, mechanical phenolic enclosed, positive-acting, spring-loaded, audible (i.e., click) snap-action switch with single pole, single throw contacts; or
- A piezo-driven solid state switch rated for a minimum of 50 V, a minimum of 20 million cycles, and capable of providing an audible indication of actuation.

The pushbutton shall have an operating voltage range of 12 to 36 VDC.

The housing shall be yellow.

Housings that include an integral sign mount for the pedestrian pushbutton sign shall be capable of mounting a 9 in. by 12 in. or 9 in. by 15 in. sign (width by height).

M10.09.2: APS Pushbutton Assembly

An APS Pushbutton Assembly shall meet all of the requirements of M10.09.1: Pedestrian Pushbutton Assembly, and the following.

The pushbutton shall have a vibrotactile arrow. The arrow shall have high visual contrast (light on dark or dark on light).

APS Pushbutton Assembly shall be capable of the following:

- Emitting a locator tone.
- Providing two types of audible walk indications: an audible tone in multiple frequencies and a speech message. The type of audible walk indication will be programmed by Contractor per the Plans.
- Emitting sound via one or more speakers that automatically adjust to ambient noise and shall also be capable of being capped at a preprogrammed level.
- Providing three functions as a result of an extended pushbutton press: increased crossing time, audible beaconing, and speech pushbutton information. The function of the extended pushbutton press will be programmed by the Contractor per the Plans.

APS Pushbutton Assembly shall include a latching red LED pilot light.

Subsection M10.18.: Connected Work Zone Notification System Devices
Add this new subsection.

M10.18.0: Connected Work Zone Notification System Devices

Connected Work Zone Notification System (CWZNS) devices shall include the following:

- An internal 4G LTE or 5G cellular modem. The modem shall be compatible with SIM cards from multiple cellular carriers, or the device shall be capable of using a cellular modem from more than one cellular carrier.
- An integrated GPS that will allow for automated telemetry without additional configuration.
- A self-contained power source that can be recharged without manual intervention. The power source shall enable uninterrupted operation of the CWZNS field device.
- Mounting and supporting hardware and wiring necessary to complete a working system.

CWZNS devices shall be capable of operating in temperatures ranging from -40°F to +122°F with no degradation in operation due to rain, fog, snow, ice, darkness, dust, or road debris.

CWZNS devices shall be physically and digitally secured to prevent unauthorized access.

When powered on, real-time data from CWZNS devices shall be provided in a USDOT Work Zone Data Exchange (WZDx) Specification Device Feed version 4.2. The Device Feed shall then be able to be consumed by the MassDOT Work Zone Manager (WZM) application. The Device Feed shall meet the following requirements:

- Each manufacturer of CWZNS field devices and Smart Work Zone (SWZ) field devices shall provide a single statewide Device Feed (a single URL) that consists of that manufacturer's field devices that are used by or under the direction of the Department.
- The Device Feed shall be made available via an HTTP GET request. The response shall be the WZDx Device Feed JSON object without a wrapper or paging.
- The Device Feed shall be public or use "Basic" HTTP Authentication.
- The Device Feed shall be provided over HTTPS.
- The Device Feed shall reflect changes in CWZNS field device status (e.g., display changed or device moved) no later than 60 seconds after they occur.
- For each CWZNS field device, the "update date" property shall be no older than 60 minutes, except when it has stopped communicating or is otherwise in error.
- The "id" property of each CWZNS field device feature in the Device Feed shall stay the same for the duration of the Contract and shall be a Universally Unique IDentifier (UUID) to guarantee uniqueness between feeds and over time.

M10.18.1: Location Marker

Location Markers shall meet the requirements of M10.18.0: Connected Work Zone Notification System Devices.

Location Markers may be standalone devices or an attachment to a channelizing device. Either type shall be certified to comply with the relevant minimum TL-3 testing requirements of the *Manual on Assessing Safety Hardware*.

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END OF SUPPLEMENTAL SPECIFICATIONS

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FHWA-1273 – Revised October 23, 2023

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Non-segregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
XI. Certification Regarding Use of Contract Funds for Lobbying
XII. Use of United States-Flag Vessels:

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (*see* 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than $10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH–1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to DBAconformance@dol.gov. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to DBAconformance@dol.gov, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.* Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH–347 or in any other format desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH–347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 will satisfy the requirement for submission of the “Statement of Compliance” required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* $31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of $150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B) This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

DOCUMENT 00811

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
Revised: 02/03/2023

This provision applies to all projects using greater than 100 tons of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price
The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price
The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at https://www.mass.gov/service-details/massdot-current-contract-price-adjustments following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.

Price Adjustment Determination, Calculation and Payment
The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.

Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the approved Job Mix Formula.

Price Adjustments will be separate payment items. The pay item numbers are 999.401 for a positive price adjustment (a payment) and 999.402 for a negative price adjustment (a deduction). Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS
Revised: 02/01/2021

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site https://www.mass.gov/service-details/massdot-current-contract-price-adjustments for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	FUEL FACTORS	
	Diesel	**Gasoline**
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144, 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

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DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

July 15, 2026

This special provision applies to all projects containing the use of structural steel and/or reinforcing steel as specified elsewhere in the Contract work. It applies to all structural steel and all reinforcing steel, as defined below, on the project. Compliance with this provision is mandatory, i.e., there are no "opt-in" or "opt-out" clauses. Price adjustments will be handled as described below and shall only apply to unfabricated reinforcing steel bars and unfabricated structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings.

Price adjustments will be variances between Base Prices and Period Prices. Base Prices and Period Prices are defined below.

Price adjustments will only be made if the variances between Base Prices and Period Prices are 5% or more. A variance can result in the Period Price being either higher or lower than the Base Price. Once the 5% threshold has been achieved, the adjustment will apply to the full variance between the Base Price and the Period Price.

Price adjustments will be calculated by multiplying the number of pounds of unfabricated structural steel material or unfabricated reinforcing steel bars on a project by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will ***not*** include guardrail panels or the costs of shop drawing preparation, handling, fabrication, coatings, transportation, storage, installation, profit, overhead, fuel costs, fuel surcharges, or other such charges not related to the cost of the unfabricated structural steel and unfabricated reinforcing steel.

The weight of steel subject to a price adjustment shall not exceed the final shipping weight of the fabricated part by more than 10%.

Base Prices and Period Prices are defined as follows:

Base Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are fixed prices determined by the Department and found in the table below. While it is the intention of the Department to make this table comprehensive, some of a project's unfabricated structural steel and/or unfabricated reinforcing steel may be inadvertently omitted. Should this occur, the Contractor shall bring the omission to the Department's attention so that a contract alteration may be processed that adds the missing steel to the table and its price adjustments to the Contract.

The Base Price Date is the month and year of the most recent finalized period price index at the time that MassDOT opened bids for the project. The Base Price Index for this contract is the Steel PPI listed in the Notice to Contractors.

Period Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices that have been calculated using the Period Price Date and an index of steel prices to adjust the Base Price.

The Period Price Date is the date the steel was delivered to the fabricator as evidenced by an official bill of lading submitted to the Department containing a description of the shipped materials, weights of the shipped materials and the date of shipment. This date is used to select the Period Price Index.

The index used for the calculation of Period Prices is the U.S. Department of Labor Bureau of Labor Statistics Producer Price Index (PPI) Series ID WPU101702 (Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Semi-finished Steel Mill Products.) As this index is subject to revision for a period of up to four (4) months after its original publication, no price adjustments will be made until the index for the period is finalized, i.e., the index is no longer suffixed with a "(P)".

Period Prices are determined as follows:

Period Price = Base Price X Index Factor
Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

Calculate the Period Price for December 2009 using a Base Price from March 2009 of $0.82/Pound for 1,000 Pounds of ASTM A709 (AASHTO M270) Grade A36 Structural Steel Plate.

The Period Price Date is December 2009. From the PPI website*, the Period Price Index = 218.0.

The Base Price Date is March 2009. From the PPI website*, the Base Price Index = 229.4.

Index Factor = Period Price Index / Base Price Index = 218.0 / 229.4 = 0.950
Period Price = Base Price X Index Factor = $0.82/Pound X 0.950 = $0.78/Pound

Since $0.82 - $0.78 = $0.04 is less than 5% of $0.82, no price adjustment is required.

If the $0.04 difference shown above was greater than 5% of the Base Price, then the price adjustment would be 1,000 Pounds X $0.04/Pound = $40.00. Since the Period Price of $0.78/Pound is less than the Base Price of $0.82/Pound, indicating a drop in the price of steel between the bid and the delivery of material, a credit of $40.00 would be owed to MassDOT. When the Period Price is higher than the Base Price, the price adjustment is owed to the Contractor.

* To access the PPI website and obtain a Base Price Index or a Period Price Index, go to http://data.bls.gov/cgi-bin/srgate

End of example.

The Contractor will be paid for unfabricated structural steel and unfabricated reinforcing steel under the respective contract pay items for all components constructed of either structural steel or reinforced Portland cement concrete under their respective Contract Pay Items.

Price adjustments, as herein provided for, will be paid separately as follows:

Structural Steel
Pay Item Number 999.449 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.457 for negative (-) pay adjustments (credits to MassDOT Highway Division)

Reinforcing Steel
Pay Item Number 999.466 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.467 for negative (-) pay adjustments (credits to MassDOT Highway Division)

No price adjustment will be made for price changes after the Contract Completion Date, unless the MassDOT Highway Division has approved an extension of Contract Time for the Contract.

TABLE

Steel Type		Price per Pound
1	ASTM A615/A615M Grade 60 (AASHTO M31 Grade 60 or 420) Reinforcing Steel	$0.57
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note below.)	$0.80
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	$0.80
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	$0.82
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	$0.86
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	$0.81
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	$0.86
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	$0.81
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	$0.89
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	$0.82
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	$0.89
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	$0.82
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	$0.93
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	$1.00
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	$1.53
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	$0.89
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	$0.82
18	ASTM A276 Type 316 Stainless Steel	$4.61
19	ASTM A240 Type 316 Stainless Steel	$4.61
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	$1.58
21	ASTM A53 Grade B Structural Steel Pipe	$1.00
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	$1.00
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	$0.80
24	ASTM 252, Grade 2 Permanent Steel Casing	$0.80
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	$0.84
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	$1.51
27	ASTM A572 / A572M, Grade 50 Sheetpiling	$1.51
28	ASTM A36/36M, Grade 50	$0.86
29	ASTM A570, Grade 50	$0.84
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	$0.86
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	$1.00
32	AREA 140 LB Rail and Track Accessories	$0.52

NOTE: Steel Castings are generally used only on moveable bridges. Cast iron frames, grates and pipe are not “steel” castings and will not be considered for price adjustments.

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DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassDOT website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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DOCUMENT 00820

THE COMMONWEALTH OF MASSACHUSETTS SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY, NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

I. Definitions

For purposes of this contract,

"Minority" means a person who meets one or more of the following definitions:

(a) American Indian or Native American means: all persons having origins in any of the original peoples of North America and who are recognized as an Indian by a tribe or tribal organization.
(b) Asian means: All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian sub-continent, or the Pacific Islands, including, but Not limited to China, Japan, Korea, Samoa, India, and the Philippine Islands.
(c) Black means: All persons having origins in any of the Black racial groups of Africa, including, but not limited to, African-Americans, and all persons having origins in any of the original peoples of the Cape Verdean Islands.
(d) Eskimo or Aleut means: All persons having origins in any of the peoples of Northern Canada, Greenland, Alaska, and Eastern Siberia.
(e) Hispanic means: All persons having their origins in any of the Spanish-speaking peoples of Mexico, Puerto Rico, Cuba, Central or South America, or the Caribbean Islands.

"State construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility, or a contract for the construction, reconstruction, alteration, remodeling or repair of a public work undertaken by a department, agency, board, or commission of the commonwealth.

"State assisted construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility undertaken by a political subdivision of the commonwealth, or two or more political subdivisions thereof, an authority, or other instrumentality and whose costs of the contract are paid for, reimbursed, grant funded, or otherwise supported, in whole or in part, by the commonwealth.

II. Equal Opportunity, Non-Discrimination and Affirmative Action

During the performance of this Contract, the Contractor and all subcontractors (hereinafter collectively referred to as "the Contractor") for a state construction contract or a state assisted construction contract, for him/herself, his/her assignees and successors in interest, agree to comply with all applicable equal employment opportunity, non-discrimination and affirmative action requirements, including but not limited to the following:

In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability, shall not discriminate in the selection or retention of subcontractors, and shall not discriminate in the procurement of materials and rentals of equipment.

The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising, layoff or termination; rates of pay or other forms of compensation; conditions or privileges of employment; and selection for apprenticeship or on-the-job training opportunity. The Contractor shall comply with the provisions of chapter 151B of the Massachusetts General Laws, as amended, and all other applicable anti-discrimination and equal opportunity laws, all of which are herein incorporated by reference and made a part of this Contract.

The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Massachusetts Commission Against Discrimination setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter l51 B).

In connection with the performance of work under this contract, the Contractor shall undertake, in good faith, affirmative action measures to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. Such affirmative action measures shall entail positive and aggressive measures to ensure nondiscrimination and to promote equal opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, layoff or termination, rate of compensation, apprenticeship and on-the-job training programs. A list of positive and aggressive measures shall include, but not be limited to, advertising employment opportunities in minority and other community news media; notifying minority, women and other community-based organizations of employment opportunities; validating all job specifications, selection requirements, and tests; maintaining a file of names and addresses of each worker referred to the Contractor and what action was taken concerning such worker; and notifying the administering agency in writing when a union with whom the Contractor has a collective bargaining agreement has failed to refer a minority or woman worker. These and other affirmative action measures shall include all actions required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. One purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future Commonwealth public construction projects.

III. Minority and Women Workforce Participation

Pursuant to his/her obligations under the preceding section, the Contractor shall strive to achieve on this project the labor participation goals contained herein. Said participation goals shall apply in each job category on this project including but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers and those classes of work enumerated in Section 44F of Chapter 149 of the Massachusetts General Laws. The participation goals for this project shall be 15.3% for minorities and 6.9% for women. The participation goals, as set forth herein, shall not be construed as quotas or set-asides; rather, such participation goals will be used to measure the progress of the Commonwealth's equal opportunity, non-discrimination and affirmative action program. Additionally, the participation goals contained herein should not be seen or treated as a floor or as a ceiling for the employment of particular individuals or group of individuals.

IV. Liaison Committee

At the discretion of the agency that administers the contract for the construction project there may be established for the life of the contract a body to be known as the Liaison Committee. The Liaison Committee shall be composed of one representative each from the agency or agencies administering the contract for the construction project, hereinafter called the administering agency, a representative from the Office of Affirmative action, and such other representatives as may be designated by the administering agency. The Contractor (or his/her agent, if any, designated by him/her as the on-site equal employment opportunity officer) shall recognize the Liaison Committee as an affirmative action body, and shall establish a continuing working relationship with the Liaison Committee, consulting with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.

V. Reports and Records

The Contractor shall prepare projected workforce tables on a quarterly basis when required by the administering agency. These shall be broken down into projections, by week, of workers required in each trade. Copies shall be furnished one week in advance of the commencement of the period covered, and also, when updated, to the administering agency and the Liaison Committee when required.

The Contractor shall prepare weekly reports in a form approved by the administering agency, unless information required is required to be reported electronically by the administering agency, the number of hours worked in each trade by each employee, identified as woman, minority, or non-minority. Copies of these shall be provided at the end of each such week to the administering agency and the Liaison Committee.

Records of employment referral orders, prepared by the Contractor, shall be made available to the administering agency on request.

The Contractor will provide all information and reports required by the administering agency on instructions issued by the administering agency and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the administering agency to effect the employment of personnel. This provision shall apply only to information pertinent to the Commonwealth's supplementary non-discrimination, equal opportunity and access and opportunity contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering agency and shall set forth what efforts he has made to obtain the information.

VI. Access to Work Site

A designee of the administering agency and a designee of the Liaison Committee shall each have a right to access the work site.

VII. Solicitations for Subcontracts, and for the Procurement of Materials and Equipment

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or equipment, each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under this contract relative to non-discrimination and equal opportunity.

VIII. Sanctions

Whenever the administering agency believes the General or Prime Contractor or any subcontractor may not be operating in compliance with the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151B), the administering agency may refer the matter to the Massachusetts Commission Against Discrimination ("Commission") for investigation.

Following the referral of a matter by the administering agency to the Massachusetts Commission Against Discrimination, and while the matter is pending before the MCAD, the administering agency may withhold payments from contractors and subcontractors when it has documentation that the contractor or subcontractor has violated the Fair Employment Practices Law with respect to its activities on the Project, or if the administering agency determines that the contractor has materially failed to comply with its obligations and the requirements of this Section. The amount withheld shall not exceed a withhold of payment to the General or Prime Contractor of 1/100 or 1% of the contract award price or $5,000, whichever sum is greater, or, if a subcontractor is in non-compliance, a withhold by the administering agency from the General Contractor, to be assessed by the General Contractor as a charge against the subcontractor, of 1/100 or 1% of the subcontractor price, or $1,000 whichever sum is greater, for each violation of the applicable law or contract requirements. The total withheld from anyone General or Prime Contractor or subcontractor on a Project shall not exceed $20,000 overall. No withhold of payments or investigation by the Commission or its agent shall be initiated without the administering agency providing prior notice to the Contractor.

If, after investigation, the Massachusetts Commission Against Discrimination finds that a General or Prime Contractor or subcontractor, in commission of a state construction contract or state-assisted construction contract, violated the provisions of the Fair Employment Practices Law, the administering agency may convert the amount withheld as set forth above into a permanent sanction, as a permanent deduct from payments to the General or Prime Contractor or subcontractor, which sanction will be in addition to any such sanctions, fines or penalties imposed by the Massachusetts Commission Against Discrimination.

No sanction enumerated under this Section shall be imposed by the administering agency except after notice to the General or Prime Contractor or subcontractor and an adjudicatory proceeding, as that term is used, under Massachusetts General Laws Chapter 30A, has been conducted.

IX. Severability

The provisions of this section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.

X. Contractor's Certification

After award and prior to the execution of any contract for a state construction contract or a state assisted construction contract, the Prime or General Contractor shall certify that it will comply with all provisions of this Document 00820 Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program, by executing Document 00859 Contractor/Subcontractor Certification Form.

XI. Subcontractor Requirements

Prior to the award of any subcontract for a state construction contract or a state assisted construction contract, the Prime or General Contractor shall provide all prospective subcontractors with a complete copy of this Document 00820 entitled "Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program" and will incorporate the provisions of this Document 00820 into any and all contracts or work orders for all subcontractors providing work on the Project. In order to ensure that the said subcontractor's certification becomes a part of all subcontracts under the prime contract, the Prime or General Contractor shall certify in writing to the administering agency that it has complied with the requirements as set forth in the preceeding paragraph by executing Document 00859 Contractor/Subcontractor Certification Form.

Rev'd 03/07/14

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DOCUMENT 00821

ELECTRONIC REPORTING REQUIREMENTS
CIVIL RIGHTS PROGRAMS AND CERTIFIED PAYROLL

Implemented on March 2, 2009 Revised June 04, 2019

The Massachusetts Department Of Transportation (MassDOT) has replaced the CHAMP reporting system with Equitable Business Opportunity Solution (EBO), a new web-based civil rights reporting software system. This system is capable of handling both civil rights reporting requirements and certified payrolls. The program's functions include the administration of Equal Employment Opportunity (EEO) requirements, On-The-Job Training requirements (OJT), Disadvantage Business Enterprise (DBE) and/or Minority / Women's Business Enterprise (M/WBE) subcontracting requirements, and the electronic collection of certified payrolls associated with MassDOT projects. In addition, this system is used to generate various data required as part of the American Recovery and Reinvestment Act (ARRA). Contractors are responsible for all coordination with all sub-contractors to ensure timely and accurate electronic submission of all required data.

Contractor and Sub-Contractor EBO User Certification

All contractors and sub-contractors must use the EBO software system. The software vendor, Internet Government Solutions (IGS), has developed an online EBO Training Module that is available to contractors and sub-contractors. This module is a self-tutorial which allows all users in the company to access the training, complete the tutorial, and become certified as EBO users for a one time fee of $75.00. This is the only cost to contractors and sub-contractors associated with the EBO software system. The online EBO Training Module can be accessed at www.ebotraining.com. Click the "Register My Company" button on the login page to begin your training registration. Questions regarding EBO online training should be directed to Gerry Anguilano, IGS at (440) 238-1684.

MassDOT will track contractors and sub-contractors who have successfully completed the on-line training module. All persons performing civil rights program and/or certified payroll functions should be EBO certified.

Vetting of Firms and Designated Firm Individuals

Contractors must authorize a Primary Log-In ID Holder who has completed EBO on-line training to have access to the EBO system by completing and submitting the "Request For EBO System Log-In/Password Form" located on the MassDOT website at: https://www.mass.gov/how-to/how-to-get-an-ebo-login
Contractors must also agree to comply with the EBO system user agreement located on the MassDOT website.

All subcontracts entered into on a project must include language that identifies the submission and training requirements that the sub-contractor must perform. Sub-contractors will be approved by the respective District Office of MassDOT through the existing approval process. When new sub-contractors, who have not previously worked for MassDOT, are initially selected by a general contractor, the new sub-contractor must be approved by the District before taking the EBO on-line training module.

Interim Reporting Requirements

Until MassDOT is satisfied that the EBO system is fully operational and functioning as designed, contractors and sub-contractors will be required to submit certified payrolls manually. There will be a transition period where dual reporting, through manual and electronic submission, will be required. MassDOT, however, will notify contractors and sub-contractors when they may cease manual submission of certified payrolls.

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DOCUMENT 00859

CONTRACTOR/SUBCONTRACTOR CERTIFICATION FORM ‡

The contractor shall submit this completed document 00859 to MassDOT for each subcontract.

_____ **(Contractor)** **Date:**_____

_____**(Subcontractor)** ☐ District Approved Subcontractor

Contract No: 136412 **Project No.** 608744 **Federal Aid No.:** **STP/CMQ/TAP/PRC(PRC80)/FLP--0035(070)X**

Location: PROVINCETOWN

Project Description: **Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street**

PART 1 CONTRACTOR CERTIFICATION: I hereby certify, as an authorized official of this company, that to the best of my knowledge, information and belief, the company is in compliance with all applicable federal and state laws, rules, and regulations governing fair labor and employment practices, that the company will not discriminate in their employment practices, that the company will make good faith efforts to comply with the minority employee and women employee workforce participation ratio goals and specific affirmative action steps contained in Contract Document 00820 The Commonwealth of Massachusetts Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program, and that the company will comply with the special provisions and documentation indicated below (as checked).

I further hereby certify, as an authorized official of this company, that the special provisions and documentation indicated below (as checked) have been or are included in, and made part of, the Subcontractor Agreement entered into with the firm named above.

☐ **This is not a Federally-aided construction project**

Document #

☐ 00718 –Participation By Minority Or Women's Business Enterprises and SDVOBE†
☐ 00761 –Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion
☐ 00820 – MA Supplemental Equal Employment Opportunity, Non-Discrimination, and Affirmative Action Program
☐ 00821 – Electronic Reporting Requirements, Civil Rights Programs, and Certified Payroll
☐ 00859 – Contractor/Subcontractor Certification Form (this document)
☐ 00860 – MA Employment Laws
☐ 00861 – Applicable State Wage Rates in the Contract Proposal**
☐ B00842 – MA Schedule of Participation By Minority or Women Business Enterprises (M/WBEs)†
☐ B00843 – MA Letter of Intent – M/WBEs†

** Does not apply to Material Suppliers, unless performing work on-site
† Applies only if Subcontractor is a M/WBE; only include these forms for the particular M/WBE Entity

☐ B00844 - Schedule of Participation By SDVOBE
☐ B00845 - Letter of Intent – SDVOBE
☐ B00846 – M/WBE or SDVOBE Joint Check Arrangement Approval Form
☐ B00847 – Joint Venture Affidavit

☐ **This is a Federally-aided construction project (Federal Aid Number is present)**

Document #

☐ 00719 – Special Provisions for Participation by Disadvantaged Business Enterprises†
☐ 00760 - Form FHWA 1273 - Required Contract Provisions for Federal-Aid Construction Contracts
☐ 00820 – MA Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program
☐ 00821 – Electronic Reporting Requirements, Civil Rights Programs and Certified Payroll
☐ 00859 – Contractor/Subcontractor Certification Form (this document)
☐ 00860 – MA Employment Laws
☐ 00870 – Standard Federal Equal Employment Opportunity Construction Contract Specifications Executive Order 11246, (41 CFR Parts 60-4.2 and 60-4.3 (Solicitations and Equal Opportunity Clauses)*
☐ 00875 – Federal Trainee Special Provisions

☐ B00853 – Schedule of Participation by Disadvantaged Business Enterprise†
☐ B00854 – Letter of Intent – DBEs†
☐ B00855 – DBE Joint Check Arrangement Approval Form
☐ B00856 – Joint Venture Affidavit
☐ 00861/00880 - Applicable state and federal wage rates from Contract Proposal**

*Applicable only to Contracts or Subcontracts in excess of $10,000
**Does not apply to Material Suppliers, unless performing work on-site
† Applies only if Subcontractor is a DBE; only include these forms for the particular DBE Entity

Signed this _____ Day of _____, 20_____ Under The Pains And Penalties Of Perjury.

_____ _____
(Print Name and Title) (Authorized Signature)

PART 2

PART 2 SUBCONTRACTOR CERTIFICATION: I hereby certify, as an authorized official of this company, that the required documents in Part 1 above were physically incorporated in our Agreement/Subcontract with the Contractor and give assurance that this company will fully comply or make every good faith effort to comply with the same. I further certify that:

1. This company recognizes that if this is a Federal-Aid Project, then this Contract is covered by the equal employment opportunity laws administered and enforced by the United States Department of Labor ("USDOL"), Office of Federal Contract Compliance Programs ('OFCCP"). By signing below, we acknowledge that this company has certain reporting obligations to the OFCCP, as specified by 41 CFR Part 60-4.2.
2. This company further acknowledges that any contractor with fifty (50) or more employees on a Federal-aid Contract with a value of fifty-thousand ($50,000) dollars or more must annually file an EEO-1 Report (SF 100) to the EEOC, Joint Reporting Committee, on or before September 30th, each year, as specified by 41 CFR Part 60-1.7a.
3. For more information regarding the federal reporting requirements, please contact the USDOL, OFCCP Regional Office, at 1-646-264-3170 or EEO-1, Joint Reporting Committee at 1-866-286-6440.
4. This company ☐ has, ☐ has not, participated in a previous contract or subcontract subject to the Equal Opportunity clauses set forth in 41 CFR Part 60-4 and Executive Order 11246, and where required, has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance Programs or the EEO Commission all reports due under the applicable filing requirements.
5. This company is in full compliance with applicable Federal and Commonwealth of Massachusetts laws, rules, and regulations and is not currently debarred or disqualified from bidding on or participating in construction contracts in any jurisdiction of the United States. See : https://www.mass.gov/service-details/contractors-and-vendors-suspended-or-debarred-by-massdot
6. This company is properly registered and in good standing with the Office of the Secretary of the Commonwealth.

Signed this _____ Day of _____, 20_____, Under The Pains And Penalties Of Perjury.

Firm: _____
Address: _____
_____
_____
Telephone Number:_____
Federal I.D. Number:_____
Estimated Start Date:_____
Estimated Completion Date:_____
Estimated Dollar Amount:_____

_____
(Print Name and Title)

_____
(Authorized Signature)

_____
(Date)

Rev'd 09/02/22

*** END OF DOCUMENT ***

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

The Contractor's attention is directed to Massachusetts General Laws, Chapter 149, Sections 26 through 27H, and 150A. This contract is considered to fall within the ambit of that law, which provides that in general, the Prevailing Rate or Total Rate must be paid to employees working on projects funded by the Commonwealth of Massachusetts or any political subdivision including Massachusetts Department of Transportation (MassDOT).

A Federal Aid project is also subject to the Federal Minimum Wage Rate law for construction. When comparing a state minimum wage rate, monitored by the Massachusetts Attorney General, versus federal minimum wage rate, monitored by the U.S. Department of Labor Wage and Hour Division, for a particular job classification the higher wage is at all times to be paid to the affected employee.

Every contractor or subcontractor engaged in this contract to which sections twenty-seven and twenty-seven A apply will keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee on this contract, and the hours worked by, and the wages paid to, each such employee, and shall furnish to the MassDOT's Resident Engineer, on a weekly basis, a copy of said record, in a form approved by MassDOT and in accordance with M.G.L. c. 149, § 27B, signed by the employer or his/her authorized agent under the penalties of perjury.

Each such contractor or subcontractor shall preserve its payroll records for a period of three years from the date of completion of the contract.

The Prevailing Wage Rate generally includes the following:

> Minimum Hourly Wage + Employer Contributions to Benefit Plans = Prevailing Wage Rate or Total Rate
>
> Any employer who does not make contributions to Benefit Plans must pay the total Prevailing Wage Rate directly to the employee.

Any deduction from the Prevailing Wage Rate or Total Rate for contributions to benefit plans can only be for a Health & Welfare, Pension, or Supplementary Unemployment plan meeting the requirements of the Employee Retirement Income Security Act (ERISA) of 1974. The maximum allowable deduction for these benefits from the prevailing wage rate cannot be greater than the amount allowed by Executive Office of Labor (EOL) for the specified benefits. Any additional expense of providing benefits to the employees is to be borne by the employer and cannot be deducted from the Minimum Hourly Wage. If the employer's benefit expense is less than that so provided by EOL the difference will be paid directly to the employee. The rate established must be paid to all employees who perform work on the project.

When an employer makes deductions from the Minimum Hourly Wage for an employee's contribution to social security, state taxes, federal taxes, and/or other contribution programs, allowed by law, the employer shall furnish each employee a suitable pay slip, check stub or envelope notifying the employee of the amount of the deductions.

No contractor or subcontractor contracting for any part of the contract week shall require or permit any laborer or mechanic to be employed on such work in excess of forty hours in any workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of forty hours in such workweek, whichever is the greater number of overtime hours.

Apprentice Rates are permitted only when there is an Apprentice Agreement registered with the Massachusetts Division of Apprentice Training in accordance with M.G.L. c. 23, § 11E-11L.

The Prevailing Wage Rates issued for each project shall be the rates paid for the entire project. The Prevailing Wage Rates must be posted on the job site at all times and be visible from a public way.

In addition, each such contractor and subcontractor shall furnish to the MassDOT's Resident Engineer, within fifteen days after completion of its portion of the work, a statement, executed by the contractor or subcontractor or by any authorized officer or employee of the contractor or subcontractor who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

Date: _____

I , _____do hereby state:
(Name of signatory party) (Title)

That I pay or supervise the payment of the persons employed by:

_____
(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.

Signature _____

Title _____

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the MassDOT's Resident Engineer for such inspection and copying.

Massachusetts General Laws c. 149, §27, requires annual updates to prevailing wage schedules for all public construction contracts lasting longer than one year. MassDOT will request the required updates and furnish them to the Contractor. The Contractor is required to pay no less than the wage rates indicated on the annual updated wage schedules.

MassDOT will request the updates no later that two week before the anniversary of the Notice to Proceed date of the contract to allow for adequate processing by the Department of Labor Standards (DLS). The effective date for the new rates will be the anniversary date of the contract (i.e. the notice to proceed date), regardless of the date of issuance on the schedule from DLS.

All bidders are cautioned that the aforementioned laws require that employers pay to covered employees no less than the applicable minimum wages. In addition, the same laws require that the applicable prevailing wages become incorporated as part of this contract. The prevailing minimum wage law establishes serious civil and criminal penalties for violations, including imprisonment and exclusion from future public contracts. Bidders are cautioned to carefully read the relevant sections of the Massachusetts General Laws.

*** END OF DOCUMENT ***

DOCUMENT 00861

STATE PREVAILING WAGE RATES

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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS
Prevailing Wage Rates

MAURA HEALEY
Governor
KIM DRISCOLL
Lt. Governor

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority:	Massachusetts Highway	**City/Town:**	PROVINCETOWN
Wage Request No:	20260818115553	**Job Location:**	Shank Painter Road, from Route 6 to Bradford Street
Description of Work:	PROVINCETOWN Federal Aid Project No. STP/CMQ/TAP/PRC(PRC80)/FLP-0035(070)X Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street		
Contract Number:	136412		

§§ 26-27D Construction Project

This Prevailing Wage Schedule establishes the minimum wage rates that employees on this public works construction project must be paid. The project's Wage Request Number is listed above and on all pages of this Schedule. This schedule applies **only** to this specific project.

Awarding Authority Responsibilities

- You must include this Prevailing Wage Schedule (PWS) or an appropriate reference to it in all advertisements and calls for bids.
- The PWS must be incorporated in its entirety into all contracts for this project (G.L. c. 149, § 27).
- The wage rates on this PWS will remain in effect for the duration of the project. **Exception:** You must request an updated schedule for any multi-year construction project no later than 2 weeks before the project's yearly anniversary date.
  - For CM AT RISK projects, the anniversary date is the earlier of the signing date of: (a) the GMP Amendment; or (b) the first amendment to permit procurement of construction services.
  - For all other construction projects, the anniversary date is the date the contract was signed by the Awarding Authority and the General Contractor.
- You must also request an updated PWS if you have not opened bids or selected a contractor within 90 days of the date of issuance on this PWS.
  - For CM AT RISK projects, the earlier of (a) the signing date of the GMP Amendment; or (b) the bid for the first construction scope of work must be within 90 days of the date of issuance on this Schedule.
- You must provide any updated PWS to all contractors working on the project, including general and sub-contractors.
- You must keep the contractors' weekly certified payroll records and Statements of Compliance on file for **3 years.**
- Awarding authorities have other prevailing wage responsibilities not listed above. Learn more at: **[Prevailing wage: for awarding authorities | Mass.gov]** and G.L. c. 149, §§ 26-27D.

Contractor Responsibilities

- You must pay all employees who perform construction work on this project at least the wage rate listed on this PWS. **Warning!** If you do not follow this requirement, you can face civil fines, criminal charges, or private lawsuits.
- You must post this PWS at the worksite where it can be easily seen. (G.L. c. 149, § 27)
- You must file weekly payroll reports and a Statement of Compliance with the awarding authority (**not** DLS). You can file payroll reports by mail or email and must keep them on file for 3 years. Each weekly payroll report must include each employees' name, address, occupational classification(s), hours worked, and wages paid. Find a sample report at: mass.gov/dols/pw.
- You cannot pay any employees at the apprentice rates listed on this PWS unless they are registered with the Massachusetts Division of Apprentice Standards (DAS). Qualifying apprentices must be paid at the applicable step rate and must carry their apprentice ID card during all work hours on the project. Apprentices **not** registered with DAS must be paid at the listed journeyworker's rate, even if they are registered with a different federal/state public agency or private entity. For every week in which apprentice rates are paid, a copy of each apprentice's apprentice ID card issued by DAS shall be attached to the certified payroll records.
- If you don't know what classification or rate applies to the work being performed, you must ask DLS; paying the wrong rate subjects you to enforcement.
- Please contact DLS if you have any questions about the Prevailing Wage Schedule: (617) 626-6953 or **DLS.Feedback@mass.gov**

Employees who are **not** paid the wage listed on the Prevailing Wage Schedule (PWS) may file a complaint with the Attorney General's Fair Labor

Division: **www.mass.gov/ago/fld**; **(617) 727-3465.**

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.95	$16.17	$21.78	$0.00	$0.00	$79.90
	12/1/2026	$41.95	$16.17	$23.52	$0.00	$0.00	$81.64
	1/1/2027	$41.95	$16.77	$23.52	$0.00	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.02	$16.17	$21.78	$0.00	$0.00	$79.97
	12/1/2026	$42.02	$16.17	$23.52	$0.00	$0.00	$81.71
	1/1/2027	$42.02	$16.77	$23.52	$0.00	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.14	$16.17	$21.78	$0.00	$0.00	$80.09
	12/1/2026	$42.14	$16.17	$23.52	$0.00	$0.00	$81.83
	1/1/2027	$42.14	$16.77	$23.52	$0.00	$0.00	$82.43
ADS/SUBMERSIBLE PILOT PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2) For apprentice rates see "Apprentice- PILE DRIVER"	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
AIR TRACK OPERATOR LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
AIR TRACK OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (BOSTON)	12/1/2025	$44.80	$14.50	$4.30	$6.75	$0.00	$70.35
ASPHALT RAKER LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
ASPHALT RAKER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BACKHOE/FRONT-END LOADER	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BARCO-TYPE JUMPING TAMPER	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
LABORERS	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
LABORERS - ZONE 2	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY)	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
LABORERS	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
BOILER MAKER	1/1/2024	$48.12	$7.07	$14.60	$6.00	$0.00	$75.79
BOILERMAKERS LOCAL 29							
BOILERMAKERS LOCAL 29							

Apprentice: BOILER MAKER

Effective Date: 1/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
2	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
3	70.00	$33.68	$7.07	$10.03	$4.20	$0.00	$54.98
4	75.00	$36.09	$7.07	$10.74	$4.50	$0.00	$58.40
5	80.00	$38.50	$7.07	$11.45	$4.80	$0.00	$61.82
6	85.00	$40.90	$7.07	$12.18	$5.10	$0.00	$65.25
7	90.00	$43.31	$7.07	$12.88	$5.40	$0.00	$68.66
8	95.00	$45.71	$7.07	$13.62	$5.70	$0.00	$72.10

Apprentice to Journeyworker Ratio: 1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	8/1/2026	$70.15	$12.84	$15.57	$8.02	$0.00	$106.58
BRICKLAYERS LOCAL 3	2/1/2027	$71.55	$12.84	$15.57	$8.02	$0.00	$107.98
BRICKLAYERS LOCAL 3 (NEW BEDFORD)							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.08	$12.84	$15.57	$8.02	$0.00	$71.51
2	60.00	$42.09	$12.84	$15.57	$8.02	$0.00	$78.52
3	70.00	$49.11	$12.84	$15.57	$8.02	$0.00	$85.54
4	80.00	$56.12	$12.84	$15.57	$8.02	$0.00	$92.55
5	90.00	$63.14	$12.84	$15.57	$8.02	$0.00	$99.57

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.78	$12.84	$15.57	$8.02	$0.00	$72.21
2	60.00	$42.93	$12.84	$15.57	$8.02	$0.00	$79.36
3	70.00	$50.09	$12.84	$15.57	$8.02	$0.00	$86.52
4	80.00	$57.24	$12.84	$15.57	$8.02	$0.00	$93.67
5	90.00	$64.40	$12.84	$15.57	$8.02	$0.00	$100.83

Apprentice to Journeyworker Ratio: 1:5

BULLDOZER/GRADER/SCRAPER	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
CAISSON & UNDERPINNING BOTTOM MAN	6/1/2026	$50.40	$10.90	$9.75	$9.80	$0.00	$80.85
LABORERS	12/1/2026	$51.90	$10.90	$9.75	$9.80	$0.00	$82.35
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING LABORER	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
LABORERS	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING TOP MAN	6/1/2026	$49.58	$10.90	$9.75	$9.80	$0.00	$80.03
LABORERS	12/1/2026	$51.08	$10.90	$9.75	$9.80	$0.00	$81.53
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
CARBIDE CORE DRILL OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CARPENTER CARPENTERS CARPENTERS -ZONE 2 (Eastern Massachusetts)	3/1/2026	$50.85	$11.08	$11.47	$8.50	$0.00	$81.90
	9/1/2026	$52.10	$11.08	$11.47	$8.50	$0.00	$83.15
	3/1/2027	$53.35	$11.08	$11.47	$8.50	$0.00	$84.40

Apprentice: CARPENTER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$22.88	$11.08	$0.00	$1.73	$0.00	$35.69
2	45.00	$22.88	$11.08	$0.00	$1.73	$0.00	$35.69
3	55.00	$27.97	$11.08	$0.00	$3.40	$0.00	$42.45
4	55.00	$27.97	$11.08	$0.00	$3.40	$0.00	$42.45
5	70.00	$35.60	$11.08	$11.41	$5.10	$0.00	$63.19
6	70.00	$35.60	$11.08	$11.41	$5.10	$0.00	$63.19
7	80.00	$40.68	$11.08	$11.44	$6.80	$0.00	$70.00
8	80.00	$40.68	$11.08	$11.44	$6.80	$0.00	$70.00

Apprentice: CARPENTER

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$23.45	$11.08	$0.00	$1.73	$0.00	$36.26
2	45.00	$23.45	$11.08	$0.00	$1.73	$0.00	$36.26
3	55.00	$28.66	$11.08	$0.00	$3.40	$0.00	$43.14
4	55.00	$28.66	$11.08	$0.00	$3.40	$0.00	$43.14
5	70.00	$36.47	$11.08	$11.41	$5.10	$0.00	$64.06
6	70.00	$36.47	$11.08	$11.41	$5.10	$0.00	$64.06
7	80.00	$41.68	$11.08	$11.44	$6.80	$0.00	$71.00
8	80.00	$41.68	$11.08	$11.44	$6.80	$0.00	$71.00

Apprentice to Journeyworker Ratio: 1:5

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME CARPENTERS CARPENTERS-ZONE 3 (Wood Frame)	10/1/2025	$27.37	$7.38	$4.47	$1.00	$0.00	$40.22
	10/1/2026	$28.47	$7.38	$4.47	$1.00	$0.00	$41.32

All Aspects of New Wood Frame Work

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
2	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
3	65.00	$17.79	$7.38	$0.00	$1.00	$0.00	$26.17
4	70.00	$19.16	$7.38	$0.00	$1.00	$0.00	$27.54
5	75.00	$20.53	$7.38	$3.80	$1.00	$0.00	$32.71
6	80.00	$21.90	$7.38	$3.80	$1.00	$0.00	$34.08

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
7	85.00	$23.26	$7.38	$3.80	$1.00	$0.00	$35.44
8	90.00	$24.63	$7.38	$3.80	$1.00	$0.00	$36.81

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
2	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
3	65.00	$18.51	$7.38	$0.00	$1.00	$0.00	$26.89
4	70.00	$19.93	$7.38	$0.00	$1.00	$0.00	$28.31
5	75.00	$21.35	$7.38	$3.80	$1.00	$0.00	$33.53
6	80.00	$22.78	$7.38	$3.80	$1.00	$0.00	$34.96
7	85.00	$24.20	$7.38	$3.80	$1.00	$0.00	$36.38
8	90.00	$25.62	$7.38	$3.80	$1.00	$0.00	$37.80

Apprentice to Journeyworker Ratio: 1:5

CEMENT MASONRY/PLASTERING	7/1/2026	$54.49	$13.35	$16.43	$7.78	$1.80	$93.85
PLASTERERS AND CEMENT MASONS LOCAL 534	1/1/2027	$55.94	$13.35	$16.43	$7.78	$1.80	$95.30
Plasterers and Cement Masons - Zone 1	7/1/2027	$57.29	$13.35	$16.43	$7.78	$1.80	$96.65
	1/1/2028	$58.64	$13.35	$16.43	$7.78	$1.80	$98.00

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.25	$13.35	$16.43	$0.00	$0.00	$57.03
2	60.00	$32.69	$13.35	$16.43	$7.78	$1.80	$72.05
3	65.00	$35.42	$13.35	$16.43	$7.78	$1.80	$74.78
4	70.00	$38.14	$13.35	$16.43	$7.78	$1.80	$77.50
5	75.00	$40.87	$13.35	$16.43	$7.78	$1.80	$80.23
6	80.00	$43.59	$13.35	$16.43	$7.78	$1.80	$82.95
7	90.00	$49.04	$13.35	$0.00	$7.78	$0.00	$70.17

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.97	$13.35	$16.43	$0.00	$0.00	$57.75
2	60.00	$33.56	$13.35	$16.43	$7.78	$1.80	$72.92

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: CEMENT MASONRY/PLASTERING							
Effective Date: 1/1/2027							
Step / Percent		**Apprentice Base Wage**					
3 / 65.00		$36.36	$13.35	$16.43	$7.78	$1.80	$75.72
4 / 70.00		$39.16	$13.35	$16.43	$7.78	$1.80	$78.52
5 / 75.00		$41.96	$13.35	$16.43	$7.78	$1.80	$81.32
6 / 80.00		$44.75	$13.35	$16.43	$7.78	$1.80	$84.11
7 / 90.00		$50.35	$0.00	$16.43	$0.00	$0.00	$66.78
Apprentice to Journeyworker Ratio: 1:5							
CHAIN SAW OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$60.61	$17.05	$13.35	$3.25	$0.00	$94.26
	12/1/2026	$62.09	$17.05	$13.35	$3.25	$0.00	$95.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
COMPRESSOR OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DELEADER (BRIDGE) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51
Apprentice: DELEADER (BRIDGE)							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 50.00		$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2 / 55.00		$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3 / 60.00		$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4 / 65.00		$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5 / 70.00		$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6 / 75.00		$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7 / 80.00		$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8 / 90.00		$53.60	$10.35	$12.00	$11.34	$0.00	$87.29
Apprentice to Journeyworker Ratio: 1:1							
DEMO: ADZEMAN	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS LABORERS - ZONE 2	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS LABORERS LABORERS - ZONE 2	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: CONCRETE CUTTER/SAWYER LABORERS LABORERS - ZONE 2	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER LABORERS LABORERS - ZONE 2	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DIRECTIONAL DRILL MACHINE OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
DIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$78.11	$10.08	$11.62	$12.67	$0.00	$112.48
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate							
DIVER TENDER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$51.97	$10.08	$11.62	$12.67	$0.00	$86.34
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate							
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$83.69	$10.08	$11.62	$12.67	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"							
DRAWBRIDGE OPERATOR (Construction) DRAWBRIDGE - SEIU LOCAL 888 DRAWBRIDGE - SEIU LOCAL 888	7/1/2020	$26.77	$6.67	$3.93	$0.00	$0.16	$37.53
ELECTRICIAN ELECTRICIANS LOCAL 223 ELECTRICIANS LOCAL 223	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78

Apprentice: ELECTRICIAN

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$20.90	$12.25	$0.63	$0.00	$0.00	$33.78
2	45.00	$23.51	$12.25	$0.71	$0.00	$0.00	$36.47
3	50.00	$26.13	$12.25	$0.78	$0.00	$0.00	$39.16
4	55.00	$28.74	$12.25	$6.61	$2.50	$0.00	$50.10
5	60.00	$31.35	$12.25	$7.21	$2.50	$0.00	$53.31
6	65.00	$33.96	$12.25	$7.82	$2.50	$0.00	$56.53
7	70.00	$36.58	$12.25	$8.41	$2.50	$0.00	$59.74
8	75.00	$39.19	$12.25	$9.02	$2.50	$0.00	$62.96

Apprentice: ELECTRICIAN

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.89	$12.50	$0.66	$0.00	$0.00	$35.05
2	45.00	$24.62	$12.50	$0.74	$0.00	$0.00	$37.86
3	50.00	$27.36	$12.50	$0.82	$0.00	$0.00	$40.68
4	55.00	$30.10	$12.50	$6.92	$2.75	$0.00	$52.27
5	60.00	$32.83	$12.50	$7.54	$2.75	$0.00	$55.62

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: ELECTRICIAN							
Effective Date: 9/1/2026							
Step / Percent / Apprentice Base Wage							
6 / 65.00		$35.57	$12.50	$8.18	$2.75	$0.00	$59.00
7 / 70.00		$38.30	$12.50	$8.81	$2.75	$0.00	$62.36
8 / 75.00		$41.04	$12.50	$9.43	$2.75	$0.00	$65.72
Apprentice to Journeyworker Ratio: 2:3							
ELEVATOR CONSTRUCTOR	1/1/2026	$77.26	$16.38	$11.06	$10.70	$0.00	$115.40
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	$80.55	$16.48	$11.16	$11.00	$0.00	$119.19
ELEVATOR CONSTRUCTORS LOCAL 4							
Apprentice: ELEVATOR CONSTRUCTOR							
Effective Date: 1/1/2026							
Step / Percent / Apprentice Base Wage							
1 / 50.00		$38.63	$0.00	$0.00	$0.00	$0.00	$38.63
2 / 55.00		$42.49	$16.38	$11.06	$10.70	$0.00	$80.63
3 / 65.00		$50.22	$16.38	$11.06	$10.70	$0.00	$88.36
4 / 70.00		$54.08	$16.38	$11.06	$10.70	$0.00	$92.22
5 / 80.00		$61.81	$16.38	$11.06	$10.70	$0.00	$99.95
Apprentice: ELEVATOR CONSTRUCTOR							
Effective Date: 1/1/2027							
Step / Percent / Apprentice Base Wage							
1 / 50.00		$40.28	$0.00	$0.00	$0.00	$0.00	$40.28
2 / 55.00		$44.30	$16.48	$11.16	$11.00	$0.00	$82.94
3 / 65.00		$52.36	$16.48	$11.16	$11.00	$0.00	$91.00
4 / 70.00		$56.39	$16.48	$11.16	$11.00	$0.00	$95.03
5 / 80.00		$64.44	$16.48	$11.16	$11.00	$0.00	$103.08
Apprentice to Journeyworker Ratio: 1:1							
ELEVATOR CONSTRUCTOR HELPER	1/1/2026	$54.08	$16.38	$11.06	$10.07	$0.00	$91.59
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	$56.39	$16.48	$11.16	$11.00	$0.00	$95.03
ELEVATOR CONSTRUCTORS LOCAL 4							
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"							
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$54.40	$16.55	$13.35	$3.25	$0.00	$87.55
OPERATING ENGINEERS LOCAL 4	11/1/2026	$55.69	$16.55	$13.35	$3.25	$0.00	$88.84
OPERATING ENGINEERS LOCAL 4							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	5/1/2027	$57.12	$16.55	$13.35	$3.25	$0.00	$90.27
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY	5/1/2026	$56.02	$16.55	$13.35	$3.25	$0.00	$89.17
OPERATING ENGINEERS LOCAL 4	11/1/2026	$57.32	$16.55	$13.35	$3.25	$0.00	$90.47
OPERATING ENGINEERS LOCAL 4	5/1/2027	$58.77	$16.55	$13.35	$3.25	$0.00	$91.92
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$26.28	$16.55	$13.35	$3.25	$0.00	$59.43
OPERATING ENGINEERS LOCAL 4	11/1/2026	$27.04	$16.55	$13.35	$3.25	$0.00	$60.19
OPERATING ENGINEERS LOCAL 4	5/1/2027	$27.89	$16.55	$13.35	$3.25	$0.00	$61.04
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIRE ALARM INSTALLER	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
ELECTRICIANS LOCAL 223	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
ELECTRICIANS LOCAL 223							
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIRE ALARM REPAIR / MAINTENANCE	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
/ COMMISSIONING	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
ELECTRICIANS LOCAL 223							
ELECTRICIANS LOCAL 223							
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"							
FIREMAN (ASST. ENGINEER)	6/1/2026	$47.55	$17.05	$13.35	$3.25	$0.00	$81.20
OPERATING ENGINEERS LOCAL 4	12/1/2026	$48.73	$17.05	$13.35	$3.25	$0.00	$82.38
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FLAGGER & SIGNALER (HEAVY & HIGHWAY)	6/1/2026	$29.21	$10.90	$9.75	$9.21	$0.00	$59.07
LABORERS	12/1/2026	$29.21	$10.90	$9.75	$9.21	$0.00	$59.07
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FLOORCOVERER	3/1/2024	$48.93	$10.33	$11.47	$8.80	$0.00	$79.53
FLOORCOVERERS LOCAL 2168							
FLOORCOVERERS LOCAL 2168 ZONE II							

Apprentice: FLOORCOVERER

Effective Date: 3/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.47	$10.33	$0.00	$1.76	$0.00	$36.56
2	55.00	$26.91	$10.33	$0.00	$1.76	$0.00	$39.00
3	60.00	$29.36	$10.33	$0.00	$3.52	$0.00	$43.21
4	65.00	$31.80	$10.33	$0.00	$3.52	$0.00	$45.65
5	70.00	$34.25	$10.33	$11.47	$5.28	$0.00	$61.33
6	75.00	$36.70	$10.33	$11.47	$5.28	$0.00	$63.78
7	80.00	$39.14	$10.33	$11.47	$7.04	$0.00	$67.98
8	85.00	$41.59	$10.33	$11.47	$7.04	$0.00	$70.43

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice Notes							
Steps are 750 hrs.							
Apprentice to Journeyworker Ratio: 1:1							
FORK LIFT/CHERRY PICKER	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GENERATOR/LIGHTING PLANT/HEATERS	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
OPERATING ENGINEERS LOCAL 4	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	6/1/2026	$44.73	$11.20	$8.40	$6.05	$0.00	$70.38
GLAZIERS LOCAL 1333	6/1/2027	$46.73	$11.60	$8.55	$6.60	$0.00	$73.48
GLAZIERS LOCAL 1333	6/1/2028	$48.73	$12.00	$8.70	$7.20	$0.00	$76.63

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$22.37	$11.20	$8.40	$6.05	$0.00	$48.02
2	56.25	$25.16	$11.20	$8.40	$6.05	$0.00	$50.81
3	62.50	$27.96	$11.20	$8.40	$6.05	$0.00	$53.61
4	68.75	$30.75	$11.20	$8.40	$6.05	$0.00	$56.40
5	75.00	$33.55	$11.20	$8.40	$6.05	$0.00	$59.20
6	81.25	$36.34	$11.20	$8.40	$6.05	$0.00	$61.99
7	87.50	$39.14	$11.20	$8.40	$6.05	$0.00	$64.79
8	93.75	$41.93	$11.20	$8.40	$6.05	$0.00	$67.58

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)

Effective Date: 6/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.37	$11.60	$8.55	$6.60	$0.00	$50.12
2	56.25	$26.29	$11.60	$8.55	$6.60	$0.00	$53.04
3	62.50	$29.21	$11.60	$8.55	$6.60	$0.00	$55.96
4	68.75	$32.13	$11.60	$8.55	$6.60	$0.00	$58.88
5	75.00	$35.05	$11.60	$8.55	$6.60	$0.00	$61.80
6	81.25	$37.97	$11.60	$8.55	$6.60	$0.00	$64.72
7	87.50	$40.89	$11.60	$8.55	$6.60	$0.00	$67.64
8	93.75	$43.81	$11.60	$8.55	$6.60	$0.00	$70.56

Apprentice to Journeyworker Ratio: 3:1							
HOISTING ENGINEER/CRANES/GRADALLS	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$32.66	$0.00	$0.00	$0.00	$0.00	$32.66
2	60.00	$35.63	$17.05	$13.35	$3.25	$0.00	$69.28
3	65.00	$38.60	$17.05	$13.35	$3.25	$0.00	$72.25
4	70.00	$41.57	$17.05	$13.35	$3.25	$0.00	$75.22
5	75.00	$44.54	$17.05	$13.35	$3.25	$0.00	$78.19
6	80.00	$47.50	$17.05	$13.35	$3.25	$0.00	$81.15
7	85.00	$50.47	$17.05	$13.35	$3.25	$0.00	$84.12
8	90.00	$53.44	$17.05	$13.35	$3.25	$0.00	$87.09

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$33.46	$0.00	$0.00	$0.00	$0.00	$33.46
2	60.00	$36.50	$17.05	$13.35	$3.25	$0.00	$70.15
3	65.00	$39.54	$17.05	$13.35	$3.25	$0.00	$73.19
4	70.00	$42.58	$17.05	$13.35	$3.25	$0.00	$76.23
5	75.00	$45.62	$17.05	$13.35	$3.25	$0.00	$79.27
6	80.00	$48.66	$17.05	$13.35	$3.25	$0.00	$82.31
7	85.00	$51.71	$17.05	$13.35	$3.25	$0.00	$85.36
8	90.00	$54.75	$17.05	$13.35	$3.25	$0.00	$88.40

Apprentice to Journeyworker Ratio: 1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - B	4/1/2026	$44.93	$15.25	$13.63	$6.15	$2.24	$82.20

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 223	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
ELECTRICIANS LOCAL 223	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78

For apprentice rates see "Apprentice- ELECTRICIAN"

HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - B	4/1/2026	$44.93	$15.25	$13.63	$6.15	$2.24	$82.20

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (TESTING AND BALANCING -WATER) PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
HVAC MECHANIC PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS LABORERS LABORERS - ZONE 2	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (BOSTON)	9/1/2025	$60.34	$14.75	$9.52	$10.09	$0.00	$94.70
	9/1/2026	$63.76	$14.75	$9.52	$10.09	$0.00	$98.12

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$30.17	$14.75	$9.27	$5.05	$0.00	$59.24
2	60.00	$36.20	$14.75	$9.32	$6.05	$0.00	$66.32
3	70.00	$42.24	$14.75	$9.37	$7.06	$0.00	$73.42
4	80.00	$48.27	$14.75	$9.42	$8.07	$0.00	$80.51

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$31.88	$14.75	$9.27	$5.05	$0.00	$60.95
2	60.00	$38.26	$14.75	$9.32	$6.05	$0.00	$68.38
3	70.00	$44.63	$14.75	$9.37	$7.06	$0.00	$75.81
4	80.00	$51.01	$14.75	$9.42	$8.07	$0.00	$83.25

Apprentice to Journeyworker Ratio: 1:4

IRONWORKER/WELDER IRONWORKERS LOCAL 37 IRONWORKERS LOCAL 37	3/16/2021	$42.46	$7.70	$12.10	$5.00	$0.00	$67.26

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: IRONWORKER/WELDER

Effective Date: 3/16/2021

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	70.00	$29.72	$7.70	$12.10	$5.00	$0.00	$54.52
2	75.00	$31.85	$7.70	$12.10	$5.00	$0.00	$56.65
3	80.00	$33.97	$7.70	$12.10	$5.00	$0.00	$58.77
4	85.00	$36.09	$7.70	$12.10	$5.00	$0.00	$60.89
5	90.00	$38.21	$7.70	$12.10	$5.00	$0.00	$63.01
6	95.00	$40.34	$7.70	$12.10	$5.00	$0.00	$65.14

Apprentice to Journeyworker Ratio: 1:4

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01

For apprentice rates see "Apprentice- LABORER"

LABORER LABORERS LABORERS - ZONE 2	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76

Apprentice: LABORER

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.00	$10.90	$9.75	$9.11	$0.00	$54.76
2	70.00	$29.16	$10.90	$9.75	$9.11	$0.00	$58.92
3	80.00	$33.33	$10.90	$9.75	$9.11	$0.00	$63.09
4	90.00	$37.49	$10.90	$9.75	$9.11	$0.00	$67.25

Apprentice: LABORER

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.86	$10.90	$9.75	$9.11	$0.00	$55.62
2	70.00	$30.17	$10.90	$9.75	$9.11	$0.00	$59.93
3	80.00	$34.48	$10.90	$9.75	$9.11	$0.00	$64.24
4	90.00	$38.79	$10.90	$9.75	$9.11	$0.00	$68.55

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:5							
LABORER (HEAVY & HIGHWAY)	6/1/2026	$41.66	$10.90	$9.75	$9.21	$0.00	$71.52
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.21	$0.00	$72.96
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.00	$10.90	$9.75	$9.21	$0.00	$54.86
2	70.00	$29.16	$10.90	$9.75	$9.21	$0.00	$59.02
3	80.00	$33.33	$10.90	$9.75	$9.21	$0.00	$63.19
4	90.00	$37.49	$10.90	$9.75	$9.10	$0.00	$67.24

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.86	$10.90	$9.75	$9.21	$0.00	$55.72
2	70.00	$30.17	$10.90	$9.75	$9.21	$0.00	$60.03
3	80.00	$34.48	$10.90	$9.75	$9.21	$0.00	$64.34
4	90.00	$38.79	$10.90	$9.75	$9.21	$0.00	$68.65

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:5							
LABORER: CARPENTER TENDER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
LABORERS - ZONE 2	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: CEMENT FINISHER TENDER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
LABORERS - ZONE 2	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	6/1/2026	$41.75	$10.90	$9.75	$9.65	$0.00	$72.05
LABORERS	12/7/2026	$43.19	$10.90	$9.75	$9.65	$0.00	$73.49
LABORERS - ZONE 2	6/7/2027	$44.64	$10.90	$9.75	$9.65	$0.00	$74.94
	12/6/2027	$46.09	$10.90	$9.75	$9.65	$0.00	$76.39
	6/5/2028	$47.59	$10.90	$9.75	$9.65	$0.00	$77.89
	12/4/2028	$49.09	$10.90	$9.75	$9.65	$0.00	$79.39

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
LABORER: MULTI-TRADE TENDER LABORERS LABORERS - ZONE 2	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: TREE REMOVER LABORERS LABORERS - ZONE 2	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"							
LASER BEAM OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LASER BEAM OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 - MARBLE & TILE	8/1/2026	$53.84	$12.84	$15.57	$5.78	$0.00	$88.03
	2/1/2027	$54.96	$12.84	$15.57	$5.78	$0.00	$89.15

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.92	$12.84	$15.57	$5.78	$0.00	$61.11
2	60.00	$32.30	$12.84	$15.57	$5.78	$0.00	$66.49
3	70.00	$37.69	$12.84	$15.57	$5.78	$0.00	$71.88
4	80.00	$43.07	$12.84	$15.57	$5.78	$0.00	$77.26
5	90.00	$48.46	$12.84	$15.57	$5.78	$0.00	$82.65

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.48	$12.84	$15.57	$5.78	$0.00	$61.67
2	60.00	$32.98	$12.84	$15.57	$5.78	$0.00	$67.17
3	70.00	$38.47	$12.84	$15.57	$5.78	$0.00	$72.66
4	80.00	$43.97	$12.84	$15.57	$5.78	$0.00	$78.16
5	90.00	$49.46	$12.84	$15.57	$5.78	$0.00	$83.65

Apprentice to Journeyworker Ratio: 1:5

MARBLE MASONS,TILELAYERS & TERRAZZO MECH	8/1/2026	$70.17	$12.84	$15.57	$7.99	$0.00	$106.57
BRICKLAYERS LOCAL 3	2/1/2027	$71.57	$12.84	$15.57	$7.99	$0.00	$107.97
BRICKLAYERS LOCAL 3 - MARBLE & TILE							

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.09	$12.84	$15.57	$7.99	$0.00	$71.49
2	60.00	$42.10	$12.84	$15.57	$7.99	$0.00	$78.50
3	70.00	$49.12	$12.84	$15.57	$7.99	$0.00	$85.52
4	80.00	$56.14	$12.84	$15.57	$7.99	$0.00	$92.54
5	90.00	$63.15	$12.84	$15.57	$7.99	$0.00	$99.55

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.79	$12.84	$15.57	$7.99	$0.00	$72.19
2	60.00	$42.94	$12.84	$15.57	$7.99	$0.00	$79.34
3	70.00	$50.10	$12.84	$15.57	$7.99	$0.00	$86.50
4	80.00	$57.26	$12.84	$15.57	$7.99	$0.00	$93.66
5	90.00	$64.41	$12.84	$15.57	$7.99	$0.00	$100.81

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:5							
MECH. SWEEPER OPERATOR (ON CONST. SITES) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
MECHANICS MAINTENANCE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
MILLWRIGHT (Zone 2) MILLWRIGHTS LOCAL 1121 MILLWRIGHTS LOCAL 1121 - Zone 2	1/5/2026	$46.86	$10.58	$11.47	$10.00	$0.00	$78.91

Apprentice: MILLWRIGHT (Zone 2)

Effective Date: 1/5/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$25.77	$10.58	$0.00	$5.50	$0.00	$41.85
2	65.00	$30.46	$10.58	$0.00	$6.50	$0.00	$47.54
3	75.00	$35.15	$10.58	$11.47	$7.50	$0.00	$64.70
4	85.00	$39.83	$10.58	$11.47	$8.50	$0.00	$70.38

Apprentice Notes

Step 1&2 Appr. indentured after 1/6/2020 receive no pension,

Apprentice to Journeyworker Ratio: 1:4							
MORTAR MIXER LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$25.07	$17.05	$13.35	$3.25	$0.00	$58.72
	12/1/2026	$25.74	$17.05	$13.35	$3.25	$0.00	$59.39
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$31.17	$17.05	$13.35	$3.25	$0.00	$64.82
	12/1/2026	$31.97	$17.05	$13.35	$3.25	$0.00	$65.62
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$59.56	$10.35	$12.00	$12.50	$0.00	$94.41

Apprentice: PAINTER (BRIDGES/TANKS)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2	55.00	$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3	60.00	$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4	65.00	$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5	70.00	$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6	75.00	$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7	80.00	$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8	90.00	$53.60	$10.35	$12.00	$11.34	$0.00	$87.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$50.46	$10.35	$12.00	$12.60	$0.00	$85.41

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$25.23	$10.35	$0.00	$0.00	$0.00	$35.58
2	55.00	$27.75	$10.35	$0.00	$6.93	$0.00	$45.03
3	60.00	$30.28	$10.35	$0.00	$7.56	$0.00	$48.19
4	65.00	$32.80	$10.35	$0.00	$8.19	$0.00	$51.34
5	70.00	$35.32	$10.35	$12.00	$8.82	$0.00	$66.49
6	75.00	$37.85	$10.35	$12.00	$9.45	$0.00	$69.65
7	80.00	$40.37	$10.35	$12.00	$10.08	$0.00	$72.80
8	90.00	$45.41	$10.35	$12.00	$11.34	$0.00	$79.10

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$48.52	$10.35	$12.00	$12.60	$0.00	$83.47

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.26	$10.35	$0.00	$0.00	$0.00	$34.61
2	55.00	$26.69	$10.35	$0.00	$6.93	$0.00	$43.97
3	60.00	$29.11	$10.35	$0.00	$7.56	$0.00	$47.02
4	65.00	$31.54	$10.35	$0.00	$8.19	$0.00	$50.08
5	70.00	$33.96	$10.35	$12.00	$8.82	$0.00	$65.13
6	75.00	$36.39	$10.35	$12.00	$9.45	$0.00	$68.19
7	80.00	$38.82	$10.35	$12.00	$10.08	$0.00	$71.25
8	90.00	$43.67	$10.35	$12.00	$11.34	$0.00	$77.36

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, NEW) *	1/1/2026	$49.06	$10.35	$12.00	$12.60	$0.00	$84.01

* If 30% or more of surfaces to be painted are new construction,
NEW paint rate shall be used.
PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 2

Apprentice: PAINTER / TAPER (BRUSH, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.53	$10.35	$0.00	$0.00	$0.00	$34.88
2	55.00	$26.98	$10.35	$0.00	$6.93	$0.00	$44.26
3	60.00	$29.44	$10.35	$0.00	$7.56	$0.00	$47.35
4	65.00	$31.89	$10.35	$0.00	$8.19	$0.00	$50.43
5	70.00	$34.34	$10.35	$12.00	$8.82	$0.00	$65.51
6	75.00	$36.80	$10.35	$12.00	$9.45	$0.00	$68.60
7	80.00	$39.25	$10.35	$12.00	$10.08	$0.00	$71.68
8	90.00	$44.15	$10.35	$12.00	$11.34	$0.00	$77.84

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, REPAINT)	1/1/2026	$47.12	$10.35	$12.00	$12.60	$0.00	$82.07

PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 2

Apprentice: PAINTER / TAPER (BRUSH, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.56	$10.35	$0.00	$0.00	$0.00	$33.91
2	55.00	$25.92	$10.35	$0.00	$6.93	$0.00	$43.20
3	60.00	$28.27	$10.35	$0.00	$7.56	$0.00	$46.18
4	65.00	$30.63	$10.35	$0.00	$8.19	$0.00	$49.17

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: PAINTER / TAPER (BRUSH, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
5	70.00	$32.98	$10.35	$12.00	$8.82	$0.00	$64.15
6	75.00	$35.34	$10.35	$12.00	$9.45	$0.00	$67.14
7	80.00	$37.70	$10.35	$12.00	$10.08	$0.00	$70.13
8	90.00	$42.41	$10.35	$12.00	$11.34	$0.00	$76.10

Apprentice to Journeyworker Ratio: 1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.66	$10.90	$9.75	$9.21	$0.00	$71.52
	12/1/2026	$43.10	$10.90	$9.75	$9.21	$0.00	$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.78	$16.17	$21.78	$0.00	$0.00	$79.73
	12/1/2026	$41.78	$16.17	$23.52	$0.00	$0.00	$81.47
	1/1/2027	$41.78	$16.77	$23.52	$0.00	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$51.97	$10.08	$11.62	$12.67	$0.00	$86.34
For apprentice rates see "Apprentice- PILE DRIVER"							
PILE DRIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 2)	8/1/2024	$51.97	$10.08	$11.62	$12.67	$0.00	$86.34

Apprentice: PILE DRIVER

Effective Date: 8/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$23.39	$10.08	$0.00	$2.53	$0.00	$36.00
2	55.00	$28.58	$10.08	$0.00	$5.07	$0.00	$43.73
3	70.00	$36.38	$10.08	$11.62	$7.60	$0.00	$65.68
4	80.00	$41.58	$10.08	$11.62	$10.14	$0.00	$73.42

Apprentice to Journeyworker Ratio: 1:5

PIPELAYER LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
PIPELAYER (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PLUMBER & PIPEFITTER PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44

Apprentice: PLUMBER & PIPEFITTER

Effective Date: 8/25/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$22.10	$10.15	$2.50	$0.00	$0.00	$34.75
2	50.00	$27.62	$10.15	$2.50	$0.00	$0.00	$40.27
3	60.00	$33.14	$10.15	$8.40	$0.50	$0.00	$52.19
4	70.00	$38.67	$10.15	$13.44	$0.80	$0.00	$63.06
5	80.00	$44.19	$10.15	$16.80	$1.00	$0.00	$72.14

Apprentice to Journeyworker Ratio: 1:3

PNEUMATIC CONTROLS (TEMP.) PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
PNEUMATIC DRILL/TOOL OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
POWDERMAN & BLASTER LABORERS LABORERS - ZONE 2	6/1/2026	$42.66	$10.90	$9.75	$9.11	$0.00	$72.42
	12/1/2026	$44.10	$10.90	$9.75	$9.11	$0.00	$73.86
	6/1/2027	$45.55	$10.90	$9.75	$9.11	$0.00	$75.31
	12/1/2027	$47.00	$10.90	$9.75	$9.11	$0.00	$76.76
	6/1/2028	$48.50	$10.90	$9.75	$9.11	$0.00	$78.26
	12/1/2028	$50.00	$10.90	$9.75	$9.11	$0.00	$79.76
For apprentice rates see "Apprentice- LABORER"							
POWDERMAN & BLASTER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$42.66	$10.90	$9.75	$9.21	$0.00	$72.52
	12/1/2026	$44.10	$10.90	$9.75	$9.21	$0.00	$73.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
POWER SHOVEL/DERRICK/TRENCHING MACHINE	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (CONCRETE)	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (DEWATERING, OTHER)	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
OPERATING ENGINEERS LOCAL 4	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
READY-MIX CONCRETE DRIVER	8/1/2023	$25.00	$13.91	$6.90	$0.00	$0.00	$45.81
TEAMSTERS 653							
TEAMSTERS 653 - Southeastern Concrete (Weymouth)							
RECLAIMERS	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
RIDE-ON MOTORIZED BUGGY OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
ROLLER/SPREADER/MULCHING MACHINE	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)	2/1/2026	$53.53	$14.53	$12.67	$9.03	$0.00	$89.76
ROOFERS LOCAL 33							
ROOFERS LOCAL 33							

Apprentice: ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.77	$14.53	$6.52	$9.03	$0.00	$56.85
2	60.00	$32.12	$14.53	$12.67	$9.03	$0.00	$68.35
3	65.00	$34.79	$14.53	$12.67	$9.03	$0.00	$71.02
4	75.00	$40.15	$14.53	$12.67	$9.03	$0.00	$76.38
5	85.00	$45.50	$14.53	$12.67	$9.03	$0.00	$81.73

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice Notes

** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1

Apprentice to Journeyworker Ratio: 1:5

ROOFER SLATE / TILE / PRECAST CONCRETE ROOFERS LOCAL 33 ROOFERS LOCAL 33 For apprentice rates see "Apprentice- ROOFER"	2/1/2026	$53.78	$14.53	$12.67	$9.03	$0.00	$90.01
SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - B	4/1/2026	$44.93	$15.25	$13.63	$6.15	$2.24	$82.20

Apprentice: SHEETMETAL WORKER

Effective Date: 4/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$17.97	$15.25	$4.27	$0.00	$1.09	$38.58
2	45.00	$20.22	$15.25	$4.80	$0.00	$1.17	$41.44
3	50.00	$22.47	$15.25	$12.56	$0.00	$1.45	$51.73
4	55.00	$24.71	$15.25	$12.56	$0.00	$1.52	$54.04
5	60.00	$26.96	$15.25	$12.56	$3.69	$1.64	$60.10
6	65.00	$29.20	$15.25	$12.56	$4.00	$1.71	$62.72
7	70.00	$31.45	$15.25	$12.56	$4.31	$1.78	$65.35
8	75.00	$33.70	$15.25	$12.56	$4.61	$1.86	$67.98
9	80.00	$35.94	$15.25	$12.56	$4.92	$1.93	$70.60
10	85.00	$38.19	$15.25	$12.56	$5.23	$2.00	$73.23

Apprentice to Journeyworker Ratio: 1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.53	$16.17	$21.78	$0.00	$0.00	$80.48
	12/1/2026	$42.53	$16.17	$23.52	$0.00	$0.00	$82.22
	1/1/2027	$42.53	$16.77	$23.52	$0.00	$0.00	$82.82
SPRINKLER FITTER SPRINKLER FITTERS LOCAL 550 SPRINKLER FITTERS LOCAL 550 - (Section B) Zone 2	1/1/2026	$64.85	$13.45	$7.45	$18.25	$0.00	$104.00

Apprentice: SPRINKLER FITTER

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	0.00	$22.70	$13.45	$13.84	$0.00	$0.00	$49.99

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: SPRINKLER FITTER							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
2 / 0.00		$25.94	$13.45	$14.75	$0.00	$0.00	$54.14
3 / 0.00		$29.18	$13.45	$15.67	$0.00	$0.00	$58.30
4 / 0.00		$32.43	$13.45	$16.57	$0.00	$0.00	$62.45
5 / 0.00		$35.67	$13.45	$17.49	$0.00	$0.00	$66.61
6 / 0.00		$38.91	$13.45	$18.40	$0.00	$0.00	$70.76
7 / 0.00		$42.15	$13.45	$19.32	$0.00	$0.00	$74.92
8 / 0.00		$45.40	$13.45	$20.22	$0.00	$0.00	$79.07
9 / 0.00		$48.64	$13.45	$21.15	$0.00	$0.00	$83.24
10 / 0.00		$51.88	$13.45	$22.05	$0.00	$0.00	$87.38
Apprentice Notes							
Apprentice entered prior 9/30/10:							
Apprentice to Journeyworker Ratio: 1:3							
STEAM BOILER OPERATOR	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TELECOMMUNICATION TECHNICIAN	9/1/2025	$42.52	$12.00	$12.05	$3.25	$0.00	$69.82
TELECOMMUNICATION TECHNICIAN	9/1/2026	$44.41	$12.25	$12.59	$3.50	$0.00	$72.75
ELECTRICIANS LOCAL 223	9/1/2027	$46.51	$12.50	$13.18	$3.75	$0.00	$75.94
ELECTRICIANS LOCAL 223							
For apprentice rates and ratios see "Apprentice- ELECTRICIAN"							
TERRAZZO FINISHERS	8/1/2026	$69.09	$12.84	$15.57	$8.02	$0.00	$105.52
BRICKLAYERS LOCAL 3	2/1/2027	$70.49	$12.84	$15.57	$8.02	$0.00	$106.92
BRICKLAYERS LOCAL 3 - MARBLE & TILE							
Apprentice: TERRAZZO FINISHERS							
Effective Date: 8/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 50.00		$34.55	$12.84	$15.57	$8.02	$0.00	$70.98
2 / 60.00		$41.45	$12.84	$15.57	$8.02	$0.00	$77.88
3 / 70.00		$48.36	$12.84	$15.57	$8.02	$0.00	$84.79
4 / 80.00		$55.27	$12.84	$15.57	$8.02	$0.00	$91.70
5 / 90.00		$62.18	$12.84	$15.57	$8.02	$0.00	$98.61

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: TERRAZZO FINISHERS							
Effective Date: 2/1/2027							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 50.00		$35.25	$12.84	$15.57	$8.02	$0.00	$71.68
2 / 60.00		$42.29	$12.84	$15.57	$8.02	$0.00	$78.72
3 / 70.00		$49.34	$12.84	$15.57	$8.02	$0.00	$85.77
4 / 80.00		$56.39	$12.84	$15.57	$8.02	$0.00	$92.82
5 / 90.00		$63.44	$12.84	$15.57	$8.02	$0.00	$99.87
Apprentice to Journeyworker Ratio: 1:5							
TEST BORING DRILLER	6/1/2026	$53.25	$10.90	$9.75	$9.80	$0.00	$83.70
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$54.75	$10.90	$9.75	$9.80	$0.00	$85.20
For apprentice rates see "Apprentice- LABORER"							
TEST BORING DRILLER HELPER	6/1/2026	$49.37	$10.90	$9.75	$9.80	$0.00	$79.82
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$50.87	$10.90	$9.75	$9.80	$0.00	$81.32
For apprentice rates see "Apprentice- LABORER"							
TEST BORING LABORER	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"							
TRACTORS/PORTABLE STEAM GENERATORS	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TRAILERS FOR EARTH MOVING EQUIPMENT	6/1/2026	$42.82	$16.17	$21.78	$0.00	$0.00	$80.77
TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/1/2026	$42.82	$16.17	$23.52	$0.00	$0.00	$82.51
	1/1/2027	$42.82	$16.77	$23.52	$0.00	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR	6/1/2026	$61.48	$10.90	$9.75	$10.25	$0.00	$92.38
LABORERS LABORERS (COMPRESSED AIR)	12/1/2026	$62.98	$10.90	$9.75	$10.25	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE)	6/1/2026	$63.48	$10.90	$9.75	$10.25	$0.00	$94.38
LABORERS LABORERS (COMPRESSED AIR)	12/1/2026	$64.98	$10.90	$9.75	$10.25	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR	6/1/2026	$53.55	$10.90	$9.75	$10.25	$0.00	$84.45
LABORERS LABORERS (FREE AIR TUNNEL)	12/1/2026	$55.05	$10.90	$9.75	$10.25	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) LABORERS LABORERS (FREE AIR TUNNEL)	6/1/2026	$55.55	$10.90	$9.75	$10.25	$0.00	$86.45
	12/1/2026	$57.05	$10.90	$9.75	$10.25	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"							
VAC-HAUL TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
WAGON DRILL OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
WASTE WATER PUMP OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
WATER METER INSTALLER PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"							

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CABLE TECHNICIAN (Power Zone)	8/31/2025	$36.55	$10.75	$1.10	$1.00	$0.00	$49.40
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$38.13	$11.00	$1.14	$1.00	$0.00	$51.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$39.65	$11.25	$1.19	$1.00	$0.00	$53.09
For apprentice rates see "Apprentice- LINEMAN"							
CABLEMAN (Underground Ducts & Cables)	8/31/2025	$51.78	$10.75	$1.55	$10.71	$0.00	$74.79
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$54.02	$11.00	$1.62	$11.14	$0.00	$77.78
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$56.17	$11.25	$1.69	$11.57	$0.00	$80.68
For apprentice rates see "Apprentice- LINEMAN"							
DRIVER / GROUNDMAN CDL	8/31/2025	$42.64	$10.75	$1.28	$10.45	$0.00	$65.12
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$44.49	$11.00	$1.33	$10.80	$0.00	$67.62
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$46.26	$11.25	$1.39	$11.15	$0.00	$70.05
For apprentice rates see "Apprentice- LINEMAN"							
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs)	8/31/2025	$33.51	$10.75	$1.01	$1.00	$0.00	$46.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$34.95	$11.00	$1.05	$1.00	$0.00	$48.00
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$36.64	$11.25	$1.09	$1.00	$0.00	$49.98
For apprentice rates see "Apprentice- LINEMAN"							
EQUIPMENT OPERATOR (Class A CDL)	8/31/2025	$51.78	$10.75	$1.55	$14.79	$0.00	$78.87
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$54.02	$11.00	$1.62	$15.22	$0.00	$81.86
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$56.17	$11.25	$1.69	$15.65	$0.00	$84.76
For apprentice rates see "Apprentice- LINEMAN"							
EQUIPMENT OPERATOR (Class B CDL)	8/31/2025	$45.69	$10.75	$1.37	$11.27	$0.00	$69.08
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$47.66	$11.00	$1.43	$11.65	$0.00	$71.74
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$49.56	$11.25	$1.49	$12.03	$0.00	$74.33
For apprentice rates see "Apprentice- LINEMAN"							
GROUNDMAN	8/31/2025	$33.51	$10.75	$1.01	$1.00	$0.00	$46.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$34.95	$11.00	$1.05	$1.00	$0.00	$48.00
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$36.34	$11.25	$1.09	$1.00	$0.00	$49.68
For apprentice rates see "Apprentice- LINEMAN"							
GROUNDMAN -Inexperienced (<2000 Hrs.)	8/31/2025	$27.41	$10.75	$0.82	$1.00	$0.00	$39.98
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$28.60	$11.00	$0.86	$1.00	$0.00	$41.46
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$29.74	$11.25	$0.89	$1.00	$0.00	$42.88
For apprentice rates see "Apprentice- LINEMAN"							
JOURNEYMAN LINEMAN	8/31/2025	$60.92	$10.75	$1.83	$18.00	$0.00	$91.50
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$63.55	$11.00	$1.91	$18.50	$0.00	$94.96
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$66.08	$11.25	$1.98	$19.00	$0.00	$98.31

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$36.55	$10.75	$1.10	$2.50	$0.00	$50.90
2	65.00	$39.60	$10.75	$1.19	$2.50	$0.00	$54.04
3	70.00	$42.64	$10.75	$1.28	$2.50	$0.00	$57.17
4	75.00	$45.69	$10.75	$1.37	$4.00	$0.00	$61.81
5	80.00	$48.74	$10.75	$1.46	$4.00	$0.00	$64.95
6	85.00	$51.78	$10.75	$1.55	$4.00	$0.00	$68.08
7	90.00	$54.83	$10.75	$1.64	$6.00	$0.00	$73.22

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/30/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$38.13	$11.00	$1.14	$2.50	$0.00	$52.77
2	65.00	$41.31	$11.00	$1.24	$2.50	$0.00	$56.05
3	70.00	$44.49	$11.00	$1.33	$2.50	$0.00	$59.32
4	75.00	$47.66	$11.00	$1.43	$4.00	$0.00	$64.09
5	80.00	$50.84	$11.00	$1.53	$4.00	$0.00	$67.37
6	85.00	$54.02	$11.00	$1.62	$4.00	$0.00	$70.64
7	90.00	$57.20	$11.00	$1.72	$6.00	$0.00	$75.92

Apprentice to Journeyworker Ratio: 1:2

TELEDATA CABLE SPLICER OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$30.73	$4.70	$0.92	$2.25	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77

Additional Apprentice Information

All apprentices must be registered with the Division of Apprenticeship Training(DAS) in accordance with M.G.L.c. 23, §§ 11E-11L. Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the hourly prevailing wage rate established by the Commissioner under the provisions of M.G.L.c. 149, §§ 26-27D.

Apprentice ratios are established by DAS pursuant to M.G.L.c. 23, §§ 11E-11L. Ratios are expressed as the allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified. The ratios listed herein have been taken from relevant private collective bargaining agreements(CBAs) and are provided for illustrative purposes only. They have not been independently verified as being accurate or continuing to be accurate.

Parties having questions regarding what ratio to use should contact DAS.

DOCUMENT 00870

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS
(EXECUTIVE ORDER 11246)
Revised April 9, 2019

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted:

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

   d. "Minority" includes:

      (i) Black (all persons having origins in any of the black African racial groups not of Hispanic origin);
      (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
      (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
      (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $ 10,000 the provisions of the specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in Paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

    a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

    b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

    c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

    d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

    e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

    f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

    g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

    h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables of affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11 The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as many be required by the Government and keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

APPENDIX A

The following goals and timetables for female utilization shall be included in all Federal and federally assisted construction contracts and subcontracts in excess of $ 10,000. The goals are applicable to the Contractor's aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or federally-assisted construction contract or subcontract.

Area covered: Goal for Women apply nationwide

Goals and Timetables

Timetable	Goals (percent)
From Apr. 1, 1980 until further notice	6.9

APPENDIX B-80

Until further notice, the following goals for minority utilization in each construction craft and trade shall included in all Federal or federally assisted construction contracts and subcontracts in excess of $ 10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor's total on- site construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, federally assisted or nonfederally related project, contract or subcontract.

Construction contractors participating in an approved Hometown Plan (see 41 CFR 6-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA or EA goal contained in this Appendix B-80.

Economic Areas

STATE:	Goals (percent)
MASSACHUSETTS	
004 Boston MA: SMSA Counties: 1123 Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH	4.0
MA Essex, MA Middlesex, MA Norfolk, MA Plymouth, MA Suffolk, NH Rockingham.	
5403 Fall River- New Bedford MA, Bristol	1.6
9243 Worcester-Fitchburg-Leominster, MA	1.6
6323 Springfield-Chicopee-Holyoke MA-CT MA Hampden, MA Hampshire	4.8
Non-SMSA Counties: MA Barnstable, MA Dukes, MA Nantucket	3.6
Non-SMSA Counties: MA Franklin	5.9

APPENDIX C

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontractors, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to nondiscrimination on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto, and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Massachusetts Department of Transportation (MassDOT) or FHWA to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor will so certify to MassDOT or FHWA, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Nondiscrimination provisions of this contract, MassDOT will impose such contract sanctions as it or FHWA may determine to be appropriate, including, but not limited to:

    a. withholding payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a control, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as MassDOT or FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request MassDOT to enter into any litigation to protect the interests of MassDOT. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX D

During the performance of this contact, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor," which includes consultants) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

PERTINENT NON-DISCRIMINATION AUTHORITIES:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21

- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-Aid programs and projects)

- Federal-Aid Highway Act of 1973 (23 U.S.C. § 324 *et seq.*) (prohibits discrimination on the basis of sex)

- Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 *et seq.*), as amended (prohibits discrimination on the basis of disability) and 49 CFR Part 27

- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq.*) (prohibits discrimination on the basis of age)

- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex)

- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage, and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of Federal-Aid recipients, sub-recipients, and contractors, whether such programs or activities are Federally funded or not)

- Titles II and III of the Americans with Disabilities Act (42 U.S.C. §§ 12131-12189), as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38 (prohibits discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities)

- The Federal Aviation Administration's Non-Discrimination Statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex)

- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations)

- Executive Order 13166, Improving Access to Services for People with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100)

- Title IX of the Education Amendments Act of 1972, as amended (20 U.S.C. 1681 *et seq*.) (prohibits discrimination on the basis of sex in education programs or activities)

*** END OF DOCUMENT ***

DOCUMENT 00880

Revised January 12, 2022

DEPARTMENT OF LABOR

Employment Standards Administration

MINIMUM WAGES FOR FEDERAL AND FEDERALLY ASSISTED CONTRACTS

"General Decision Number: MA20260015 05/18/2026

State: Massachusetts

Construction Types: Highway

Counties: Massachusetts Counties of
Barnstable

Modification Number	Publication Date
0	01/02/2026
1	05/18/2026

ELEC0223-001 09/01/2024

	Rates	Fringes
ELECTRICIAN (INCLUDES TRAFFIC SIGNALIZATION).....	$ 50.02	31.05

ENGI0004-032 06/01/2025

	Rates	Fringes
POWER EQUIPMENT OPERATOR GROUP 2 BULLDOZER; GRADER/BLADE; MILLING MACHINE; ROLLER FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, LABOR DAY, MEMORIAL DAY, INDEPENDENCE DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY, CHRISTMAS DAY.....	$ 57.18	33.70
POWER EQUIPMENT OPERATOR GROUP 1 BACKHOE/EXCAVATOR/TRACKHOE; BOBCAT/SKID STEER/SKID LOADER; BROOM/SWEEPER; CRANE; GRADALL; LOADER; PAVER (ASPHALT, AGGREGATE, AND CONCRETE); POST DRIVER (GUARDRAIL/FENCES) FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, LABOR DAY, MEMORIAL DAY, INDEPENDENCE DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY, CHRISTMAS DAY.....	$ 57.83	33.70

IRON0007-026 09/16/2025

	Rates	Fringes
IRONWORKER: ORNAMENTAL AND STRUCTURAL	$ 57.87	37.67

LABO0133-001 12/01/2024

	Rates	Fringes
LABORER: CONCRETE SURFACER	$ 46.20	29.85

LABO0385-001 12/01/2024

	Rates	Fringes
LABORER: FENCE ERECTION	$ 38.95	29.41
LABORER: COMMON OR GENERAL	$ 38.95	29.41

LABO0385-005 12/01/2024

	Rates	Fringes
LABORER LANDSCAPE	$ 38.95	29.41

LABO0596-009 06/01/2025

	Rates	Fringes
LABORER (GUARDRAIL INSTALLATION)	$ 35.00	26.91

PAIN0035-023 07/01/2024

	Rates	Fringes
PAINTER: STEEL	$ 56.76	36.00

SUMA2014-005 01/11/2017

	Rates	Fringes
TRUCK DRIVER: FLATBED TRUCK	$ 48.53	0.00
TRUCK DRIVER: CONCRETE TRUCK	$ 33.69	15.79
TRAFFIC CONTROL: LABORER-CONES/ BARRICADES/BARRELS - SETTER/MOVER/SWEEPER	$ 53.35	12.78
TRAFFIC CONTROL: FLAGGER	$ 23.00	20.44
PAINTER: SPRAY (LINESTRIPING)	$ 47.30	6.42
OPERATOR: PILEDRIVER	$ 42.56	17.34
OPERATOR: MECHANIC	$ 48.74	11.79
OPERATOR: FORKLIFT	$ 64.67	0.00
LABORER: JACK HAMMER	$ 38.69	17.33
LABORER: CONCRETE SAW (HAND HELD/WALK BEHIND)	$ 44.43	14.18
LABORER: ASPHALT, INCLUDES RAKER, SHOVELER, SPREADER AND DISTRIBUTOR	$ 33.65	17.32
IRONWORKER, REINFORCING	$ 44.52	19.36
CEMENT MASON/CONCRETE FINISHER	$ 56.70	21.08
CARPENTER, INCLUDES FORM WORK	$ 43.64	22.09

TEAM0059-001 06/01/2025

	Rates	Fringes
TRUCK DRIVER: DUMP TRUCK FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....	$ 40.78	37.35

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The

applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was

updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on

a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

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DOCUMENT A00801
SPECIAL PROVISIONS

PROVINCETOWN
Federal Aid Project No. STP/CMQ/TAP/PRC(PRC80)/FLP-0035(070)X

Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street

Labor participation goals for this Project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both Contractor's and Subcontractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

All work under this Contract shall be done in conformance with the *2026 Standard Specifications for Highways and Bridges, the Supplemental Specifications* contained in this book, the *Construction Standard Details* in effect as of July 2026, the *1990 Standard Drawings for Signs and Supports*, the 2015 *Overhead Signal Structure and Foundation Standard Drawings*, the *11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD)* and the *January 2026 Massachusetts Amendments to the MUTCD*, *the 1968 Standard Drawings for Traffic Signals and Highway Lighting*, the latest edition of The *American Standard for Nursery Stock*, the Plans and these Special Provisions.

The work to be done under this Contract consists of roadway reconstruction along Shank Painter Road and Route 6, including safety improvements at the intersection of Shank Painter Road and Route 6.

Specific work items on this Project include: constructing a roundabout at the intersection of Shank Painter Road and Route 6, converting the northern Route 6 roadbed for two-way traffic and southern Route 6 roadbed to a shared-use path, full depth roadway reconstruction, pavement milling and resurfacing, full-depth roadway box widening, constructing cement concrete sidewalks and driveways, installing granite curbing and hot mix asphalt berm, constructing cement concrete pedestrian curb ramps to meet current ADA/AAB/MASSDOT accessibility requirements, street lighting, drainage system replacement, landscaping, traffic signs and new pavement markings, safety signing for traffic management, and all labor, materials and equipment necessary to complete the work shown on the plans and described hereinafter.

The proposed pump station and associated drainage work on Court Street, as well as the proposed roadway, pedestrian walkway, bike path work along Route 6 within the National Park property as identified as "Not In Contract – By others" will be constructed by separate contractors. The Contractor shall coordinate with these other contractors to ensure proper roadway connection on Route 6 within the National Park property and drainage and power connection to the pump station on Court Street.

SUBSECTION 7.05 INSURANCE REQUIREMENTS

The insurance requirements set forth in this subsection are in addition to the requirements of the Standard Specifications.

7.05.B: Public Liability Insurance 4.

Asbestos Liability Insurance shall be obtained for this project.

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 3:00 P.M. on the Tuesday of the previous week before the scheduled bid opening date. Any questions received after this time will not be considered for review by the Department.

Contractors should email questions and addendum acknowledgements to the following email address massdotspecifications@dot.state.ma.us The MassDOT proposal number and municipality is to be placed in the subject line.

NONCONFORMING COMPRESSIVE STRENGTH OF CEMENT CONCRETE

Concrete with compressive strength test results failing to attain the limits specified in Table 901.64-3 of 901.64.B: Acceptance Testing shall be evaluated for structural adequacy and serviceability at the Contractors' expense. The Department will review all production records, the concrete test records, petrographic analysis report, field notes, and the placement records for the concrete in question. If the Engineer determines the material is found to be adequate to remain in place, payment shall be adjusted in accordance with the following formula:

$$P = \frac{2(fc - f'c)(UP)(Q)}{f'c}$$

Where:

P = pay adjustment for substandard concrete
$f'c$ = specified minimum compressive strength at 28 days
fc = substandard concrete cylinder compressive strength at 56 days
Q = quantity of concrete represented by the acceptance cylinders tested
UP = unit contract price or the lump sum breakdown price per cubic yard for the class of concrete involved complete in place

BIDDERS LIST

Pursuant to the provisions of 49 CFR Part 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

The Department will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

BUILD AMERICA BUY AMERICA PREFERENCE

On Federally-aid projects the Buy America (23.CFR § 635.410) and Build America, Buy America Act. requires the following,

(1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, must occur in the United States. Foreign steel and iron can be used if the cost of the materials does not exceed 0.1% of the total Contract cost or $2,500, whichever is greater. The action of applying a coating to a covered material (i.e., steel and iron) is deemed a manufacturing process subject to Buy America. Coating includes epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of a material subject to requirements of Build America, Buy America. Steel used for temporary support of excavation, including H piles, soldier piles, and sheeting when the steel is required to be left in place is subject to requirements of Build America, Buy America. Temporary steel, shall remain in place when it falls within the influence zone of the soil supporting any structure or railroad tracks.

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States and

(3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. “Construction materials” includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of:

- non-ferrous metals,
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables),
- glass (including optic glass),
- lumber; or
- drywall.

BUILD AMERICA BUY AMERICA PREFERENCE (Continued)

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

All articles, materials, and supplies should be classified as an iron or steel product, a manufactured product, or another product as specified by law or in 2 CFR part 184 (such other products specified by law or in 2 CFR part 184 include "excluded materials" and "construction materials"); an article, material, or supply must not be considered to fall into multiple categories.

SUBSECTION 8.02 SCHEDULE OF OPERATIONS
Replace this subsection with the following:

An integrated cost and schedule controls program shall be implemented by the Contractor to track and document the progress of the Work from Notice to Proceed (NTP) through the Contractor Field Completion (CFC) Milestone. The Contractor's schedules will be used by the Engineer to monitor project progress, plan the level-of-effort required by the Department's work force and consultants and as a critical decision-making tool. Accordingly, the Contractor shall ensure that it complies fully with the requirements specified herein and that its schedules are both accurate and updated as required by the specification throughout the life of the project. Detailed requirements are provided in Division II, Section 722 Construction Scheduling.

WORK SCHEDULE

The proposed work hours shall conform to Subsection 7.09 of the Standard Specifications and be subject to the written approval of the Engineer and the following.

The work on this Contract is restricted to a normal eight (8) hour day, five (5) day work week Monday through Friday, but not on Saturdays, Sundays or holidays without prior approval of the Engineer. Work requiring lane restrictions shall be done during off-peak hours, between 9:00 AM and 3:30 PM.

The Contractor shall give notice to the Engineer at least 48 hours in advance of beginning any work affecting the maintenance of traffic and shall not proceed with surfacing operations without specific notice to, and the approval of, the Engineer.

No construction work will be allowed between Memorial Day and Labor Day without prior written approval of the Engineer and the Town. The Contractor shall provide a written request detailing the scope, locations, and anticipated duration of the work and provide temporary traffic control plans for review and approval prior to commencing any construction during the summer shutdown period.

DRAINAGE

It shall be the responsibility of the Contractor to make certain that all new drainage systems operate efficiently before final acceptance of the work. Wherever pipe is to be connected to structures, the void around the pipe shall be filled with mortar to form a watertight seal.

All the above work shall be included under the relevant drainage items without additional compensation therefore.

All drainage castings shall be adjusted to finished grade and shall be completed before the top course is laid.

EQUIVALENT SINGLE AXLE LOADS (ESALS)

The estimated traffic level to be used for SUPERPAVE HMA mixture designs for this contract, expressed in Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period, for Route 6 and Shank Painter Road is 0.2 Million and 0.3 Million 18-kip (80-kn) ESALs respectively.

SOIL STOCKPILING DIRECTIVE P-22-001

Any stockpiling of soil must be performed in compliance with Policy Directive P-22-001, Off-Site Stockpiling of Soil from MassDOT Construction Projects. This directive limits the allowable locations for off-site stockpiling of soil generated during MassDOT projects and includes various requirements that must be satisfied by the contractor prior to off-site stockpiling. The Contractor is responsible for identifying a suitable stockpile location.

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

The District Highway Director (DHD) may authorize work to continue during these specified time periods if it is determined by the District that the work will not negatively impact the traveling public. DHD may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic

Below are the holiday work restrictions:

New Years Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Martin Luther King's Birthday (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

President's Day (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Evacuation Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)
Work restrictions will be in place for Districts 3 and 6 along the entire Boston Marathon route and any other locations that the DHD in those districts determine are warranted so as to not to impact the marathon. All other districts work restrictions will be as per DHD.

Mother’s Day
No work on Western Turnpike and Metropolitan Highway System from 5:00 AM on the Friday before, until the normal start of business on the following day.

Memorial Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Bunker Hill Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Juneteenth
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

HOLIDAY WORK RESTRICTIONS (Continued)

Independence Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Labor Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)
No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)
No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)
No work on major arterials from 5:00 AM two days before until the normal start of business on the following Monday.

Christmas Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

ENVIRONMENTAL PERMITTING:

An Order of Conditions DEP# 058-0763 has been obtained from the Provincetown Conservation Commission under the Wetlands Protection Act. If field conditions and/or Contractor-proposed erection, demolition, storage, or other procedures not originally allowed by existing environmental permits require work to occur in or otherwise impact water or wetland resource areas, the Contractor is advised that no associated work can occur until all required environmental permits have been either amended or obtained allowing such work. The Contractor must notify the District 5 Highway Director and Resident Engineer in writing at least 60 days prior to desired commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated with the District 5 Environmental Engineer. The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

0763.

NOTICE TO OWNERS OF UTILITIES (Supplementing Subsection 7.13)

District 5 Utility/Constructability Engineer
Christopher Lockett, P.E.
Phone: 508-245-8795
chris.lockett@dot.state.ma.us

The Contractor shall give written notice to all public service corporations or officials, owning or having charge of public or privately owned utilities, of his intention to commence operations affecting such utilities one week in advance of the commencement of such operations. The Contractor shall, at the same time, file a copy of such notice with the Engineer.

Before commencing work on service connections, the Contractor shall contact the serving utility to ensure that proper construction procedures are followed.

A list of public and private utilities can be found on the MassDOT website at:

https://hwy.massdot.state.ma.us/webapps/utilities/select.asp?t=PROVINCETOWN&d=5&c=243

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

ELECTRIC:
Outage/ Emergency: 800-592-2000 or 844-726-7562
New Service: 1-888-633-3797 (1-888-need pwr)
Customer Support: 1-800-340-9822

In case of damage to utilities, the Contractor shall promptly notify the Engineer and shall, if requested, furnish manpower under the Engineer's direction in getting access to the utility. Pipes or other structures damaged by the operation of the Contractor may be repaired by the utility company. The cost of such repairs shall be borne by the Contractor without compensation thereafter.

The work to be done under this Contract may necessitate changes in properties of utility companies listed elsewhere in this document. Immediately after executing the Contract the Contractor shall confer with the owners of all utilities in order that relocations may be made at times consistent with operation of this Contract.

The rims of all utility manholes and boxes shall be set to conform to the required grades, and the Contractor shall see that all such setting or resetting is substantially and accurately done in conformity with the new grades, whether such setting or resetting is done by him or by companies owning or controlling same, and he shall notify the Engineer of any negligence on the part of the owners of the utilities to perform their work promptly.

The Contractor shall take test pits early in the project in order to avoid underground utility conflicts for the proposed drainage work. The other utilities such as gas work will be required prior to completion of drainage.

PROTECTION OF UTILITIES AND PROPERTY (Supplementing Subsection 7.13)

The Contractor, in constructing or installing facilities parallel to or near sewers, drains, water or gas pipes, electric or telephone conduits, poles, guys, sidewalks and/or other structures shall, at his expense, sustain them securely in place, cooperating with the officers and agents of the various utility companies and municipal departments which control them so the services of these structures may be maintained.

If live service connections are to be interrupted by excavations of any kind, the Contractor shall not break the service until new services are provided.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all the work involved in protecting or repairing property, as specified in this section, shall be considered included in the price paid for the various Contract items of work, and no additional compensation will be allowed therefore. No additional compensation will be allowed for work in the vicinity of those properties.

WORK DONE BY OTHERS

Relocation of all private utilities made necessary by the construction of this project will be accomplished by the respective utility companies.

TRUCK SAFETY DEVICES
(Supplementing Subsection 7.04: Motor Vehicles)

All motor vehicles subject to Section 7 of Chapter 90 to be operated under this Contract shall be equipped with safety devices as provided therein and in 540 CMR 4.00.

The Contractor shall certify to the Registry of Motor Vehicles, in a manner prescribed by the Registrar, that all applicable vehicles are equipped with Lateral Protective Devices, Convex Mirrors, Cross Over Mirror(s) and Back Up Cameras in accordance with the requirements of 540 CMR 4.00.

The Contractor shall provide evidence satisfactory to the Department to demonstrate compliance with the above certification requirement for all applicable vehicles operated under this Contract by the Contractor and its subcontractors and vendors in a manner set forth by the Department. Thereafter, the Contractor shall have an affirmative obligation to continue to provide such evidence of compliance on an ongoing basis and no later than 7 days after certification with the Registry of Motor Vehicles of any additional vehicles operated under this Contract by the Contractor and its subcontractors and vendors.

Non-compliance with respect to a vehicle that is subject to 540 CMR 4.00 may subject the Contractor to statutory fines as established in M.G.L. c. 90, § 7 and/or contractual remedies up to and including termination of the Contract.

PRECAUTIONS UNDER ELECTRIC LINES

The bidders attention is directed to the AASHTO Guide on Occupational Safety on Highway Construction Projects, Subpart N, 1926.550, relating to construction equipment clearances at overhead electric lines, which states in part "...the minimum clearance between the lines and any part of the crane or load must be at least 10 feet from lines rated 50 KV or below, and greater distances for higher voltage...".

For the protection of personnel and equipment, the Contractor should be aware of this regulation especially during paving operations using large semi-trailer vehicles.

CONTAMINATED SOIL

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. No soil may be disposed of off-site without proper assessment by the contractor and approval from the Resident Engineer (RE), District Environmental Engineer (DEE), or the project designee.

REMOVED AND STACKED

Unless otherwise specified herein, the Contractor shall make arrangements with the Town for pickup of stored Removed and Stacked items on site and shall get a receipt from the Town for materials picked up for submission to the Engineer for payment.

EMERALD ASH BORER ADVISORY

To the extent possible, all trees and brush shall be disposed on site, typically chipped and spread in place. When trees or brush must be removed, such as in urban, or otherwise populated areas, Contractor shall identify proposed location for disposal, and provide written notification to the Engineer for approval. Disposal shall be in city or town of project, or at minimum, within county, of construction operations.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION FILE NUMBER SIGN

This project is subject to Massachusetts General Laws, Chapter 131, Section 40 as amended. Signs shall be in accordance with the latest MassDOT Construction Standards. All costs for the manufacture, erection, maintenance, moving, and removal of the signs shall be absorbed by the contractor with no additional compensation other than the contract unit prices.

For this project the Massachusetts Department of Environmental Protection File Number is 058-

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

In accordance with the provisions of Section 8.00 Prosecution and Progress, utility coordination is a critical aspect to this Contract. This section defines the responsibility of the Contractor and MassDOT, with regard to the initial utility relocation plan and changes that occur as the prosecution of the Work progresses. The Engineer, with assistance from the Contractor shall coordinate with Utility companies that are impacted by the Contractor's operations. To support this effort, the Contractor shall provide routine and accurate schedule updates, provide notification of delays, and provide documentation of the steps taken to resolve any conflicts for the temporary and/or permanent relocations of the impacted utilities. The Contractor shall provide copies to the Engineer of the Contractor communication with the Utility companies, including but not limited to:

- Providing advanced notice, for all utility-related meetings initiated by the Contractor.
- Providing meeting minutes for all utility-related meetings that the Contractor attends.
- Providing all test pit records.
- Request for Early Utility work requirements of this section (see below).
- Notification letters for any proposed changes to Utility start dates and/or sequencing.
- Written notification to the Engineer of all apparent utility delays within seven (7) Calendar Days after a recognized delay to actual work in the field – either caused by a Utility or the Contractor.
- Any communication, initiated by the Contractor, associated with additional Right-of-Way needs in support of utility work.
- Submission of completed Utility Completion Forms.

B. PROJECT UTILITY COORDINATION (PUC) FORM

The utility schedule and sequence information provided in the Project Utility Coordination Form (if applicable) is the best available information at the time of the bid and has been considered in setting the contract duration. The Contractor shall use all of this information in developing the bid price and the Baseline Schedule Submission, inclusive of the individual utility durations sequencing requirements, and any work that has been noted as potentially concurrent utility installations.

C. INITIATION OF UTILITY WORK

The Engineer will issue all initial notice-to-proceed dates to each Utility company based on either the:

1) Contractor's accepted Baseline Schedule
2) An approved Early Utility Request in the form of an Early Utility sub-net schedule (in accordance with the requirements of this Subsection)
3) An approved Proposal Schedule

C.1 - BASELINE SCHEDULE – UTILITY BASIS

The Contractor shall provide a Baseline Schedule submission in accordance with the requirements of Subsection 8.02 and inclusive of all of the information provided in the PUC Form that has been issued in the Contract documents. This is to include the utility durations, sequencing of work, allowable concurrent work, and all applicable considerations that have been depicted on the PUC Form.

SUBSECTION 8.14 (Continued)

C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE
All early utility work is defined as any anticipated/required utility relocations that need to occur prior to the Baseline Schedule acceptance. In all cases of proposed early utility relocation, the Contractor shall present all known information at the pre-construction conference in the form of a 'sub-net' schedule showing when each early utility activity needs to be issued a notice-to-proceed. The Contractor shall provide advance notification of this intent to request early utility work in writing at or prior to the Pre-Construction meeting. Prior to officially requesting approval for early utility work, the Contractor shall also coordinate with MassDOT and all utility companies (private, state or municipal) which may be impacted by the Contract. If this request is acceptable to the Utilities and to MassDOT, the Engineer will issue a notice-to-proceed to the affected Utilities, based on these accepted dates.

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM
If the Contractor intends to submit a schedule (in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02) that contains durations or sequencing that vary from those provided in the Project Utility Coordination (PUC) Form, the Contactor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.

D. UTILITY DELAYS
The Contractor shall notify the Engineer upon becoming aware that a Utility owner is not advancing the work in accordance with the approved utility schedule. Such notice shall be provided to the Engineer no later than seven (7) calendar days after the occurrence of the event that the Contractor believes to be a utility delay. After such notice, the Engineer and the Contractor shall continue to diligently seek the Utility Owner's cooperation in performing their scope of Work.

In order to demonstrate that a critical path delay has been caused by a third-party Utility, the Contractor must demonstrate, through the requirements of the monthly Progress Schedule submissions and the supporting contract records associated with Subsection 8.02, 8.10 and 8.14, that the delays were beyond the control of the Contractor.

SUBSECTION 8.14 (Continued)

All documentation provided in this section is subject to the review and verification of the Engineer and, if required, the Utility Owner. In accordance with MassDOT Specifications, Division I, Subsection 8.10, a Time Extension will be granted for a delay caused by a Utility, only if the actual duration of the utility work is in excess of that shown on the Project Utility Coordination Form, and only if;

1) proper Notification of Delay was provided to MassDOT in accordance with the time requirements that are specified in this Section
2) the utility delay is a critical path impact to the Baseline Schedule (or most recently approved Progress Schedule)

E. LOCATION OF UTILITIES
The locations of existing utilities are shown on the Contract drawings as an approximation only. The Contractor shall perform a pre-construction utility survey, including any required test pits, to determine the location of all known utilities no later than thirty (30) calendar days before commencing physical site work in the affected area.

F. POST UTILITY SURVEY – NOTIFICATION
Following completion of a utility survey of existing locations, the Contractor will be responsible to notify the Engineer of any known conflicts associated with the actual location of utilities prior to the start of the work. The Engineer and the Contractor will coordinate with any utility whose assets are to be affected by the Work of this Contract. A partial list of utility contact information is provided in the Project Utility Coordination Form.

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS
The Contractor shall notify the Engineer in advance of any meeting they initiate with a Utility Owner's representative to allow MassDOT to participate in the meeting if needed.

Prior to the Pre-Construction Meeting, the Contractor should meet with all Utility Owners who will be required to perform utility relocations within the first 6 months of the project, to update the affected utilities of the Project Utility Coordination Form and all other applicable Contract requirements that impact the Utilities. The Contractor shall copy the Engineer on any correspondence between the Utility Owner and the Contractor.

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS
The Engineer will be responsible for recording daily Utility work force reports. The start, suspension, re-start, and completion dates of each of the Utilities, within each phase of the utility relocation work, will be monitored and agreed to by the Engineer and the Contractor as the work progresses.

I. ACCESS AND INSPECTION
The Contractor shall be responsible for allowing Utility owners access to their own utilities to perform the relocations and/or inspections. The Contractor shall schedule their work accordingly so as not to delay or prevent each utility from maintaining their relocation schedule.

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

On all projects, the "Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment" Regulation (2 CFR 200.216) prohibits the Contractor from using or furnishing the following telecommunications equipment or services:

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- Telecommunications or video surveillance services provided by such entities or using such equipment.
- Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

This prohibition applies to all products manufactured by the aforementioned companies, including any individual components or parts.

By submitting a bid on a project, the Contractor certifies that all work will be in compliance with the terms of 2 CFR 200.216. The Contractor shall submit a COC indicating compliance with the above provisions for all telecommunications equipment or services included in the Contract.

Payment for the item in which the materials are incorporated may be withheld until these COCs are received. Any cost involved in furnishing the certificate(s) shall be borne by the Contractor.

CONTANIMATED SOIL

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. Quantities for soil disposal are based on the project design, existing knowledge of soil contamination in the project area, the presence of known risk factors for soil contamination in the project area, and the designer's best professional judgment.

VALUE ENGINEERING CHANGE PROPOSAL

This Subsection defines the conditions and requirements which apply to Value Engineering Change Proposals ("VECPs"). The purpose of this provision is to encourage the Contractor to propose changes in certain project requirements that will maintain the project's functional requirements at a savings in contract time, contract price, or both. The net savings obtained by using a VECP that meets the conditions and requirements set forth here will be shared by the Contractor and MassDOT.

VECP's under this provision are to be initiated, developed and submitted to MassDOT by the Contractor. The VECP must show the contemplated changes to the Drawings, Specifications and other requirements in the Contract. When a VECP submitted pursuant to this section is fully accepted by MassDOT, the VECP will be implemented by the Contractor and paid using the current cost and resource loaded schedule. Contractor shall demonstrate that the VECP is equal to, or better than, the original design or material; that there is an interest in public safety within the VECP; that there is a life-cycle cost benefit; and/or that end users will benefit from the shortened schedule. VECPs shall be consistent with the MassHighway/MassDOT Standard Specifications for Highways and Bridges and other applicable reference documents and directives. Any proposed deviation from these documents will need to be clearly identified in the VECP Proposal Documents, and must be approved by MassDOT's Chief Engineer before accepting this VECP.

A. In order to be considered for MassDOT review each VECP shall:
   1. Be clearly labeled pursuant to this Subsection;

   2. Yield a net savings at least two hundred and fifty thousand (250,000.00) Dollars and/or a net saving of contract completion duration of at least three (3) months;

   3. The proposed changes to contract items must:

      a. maintain the specified items' required functions (service life, reliability);

      b. meet applicable safety regulations and codes;

      c. material substitutions must be in accordance with DOT prequalified/preapproved products and must be tested in accordance with standard material specs/testing methods (and considering all relevant environmental, load, and other relevant factors).

      d. show economy of operation, ease of maintenance, ease of construction, and necessary standardized features and appearance; and

   4. Shall not require an extension of Contract Time or Contract Milestones, with the exception of cases when there are anticipated significant cost saving.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

The thresholds above are considered to be a general guideline. MassDOT will consider VECPs outside of these thresholds if a significant benefit is demonstrated. Additionally, notwithstanding this VECP process, MassDOT will consider minor revisions in the form of a Contract Modification.

Further, any VECP submitted shall be in sufficient detail to clearly define the proposed change. The Contractor's failure to provide information of the type, detail and in a format to facilitate the MassDOT's review, may be grounds for rejection of the VECP. Additionally, the Contractor will not be entitled to any equitable adjustment or increased Time, due to any aspect of any of the proposed VECP including permitting, right of way, utility coordination or delayed responses by MassDOT. If, after the progression of the work associated with the executed Contract Modification for the VECP, any additional costs are realized by the Contractor or any of the sub- consultants, sub-contractors, or suppliers, the Contractor shall be obligated to pay for any and all costs.

B. The following initial items shall be provided by the Contractor for MassDOT's review. Items 1-6 need to be submitted prior to the start of MassDOT's review of the VECP and item 7 is an important consideration for the pricing of the VECP and the timeline of the proposed VECP schedule.

1. **VECP Description**: A description of the difference between the existing and the proposed Contract requirements, and the comparative advantages and disadvantages of each;

2. **VECP Change Listing**: A listing of the Contract requirements that will need to be changed, modified, or reviewed as well as the proposed Contract document changes in the Instructions to Bidders, Contract, Standard Specifications, General Requirements and Special Provisions required by the VECP.

3. **Construction Schedule Update:** Any changes in the Contract Time(s) or Contract Milestone(s), that will result from acceptance of the VECP, shall be accompanied by a contemporaneous schedule analysis (i.e., the Contractor's baseline schedule submission, all past/required monthly schedule updates, a detailed assessment of all past delays, and a resource loaded Critical Path Method schedule as specified in Section 8.0 / Subsection 8.02 of this Contract) of the projected Work that remains including the proposed VECP related schedule changes (inclusive of the timeline to review accept the VECP and the timeline for implementing the design changes) in the remaining work. This shall be submitted in the form of a Proposal Schedule until the VECP has been formally accepted. Note: All of this information is to be updated, recertified, and formally accepted by MassDOT before final acceptance of this this VECP is issued.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

4. **Date for MassDOT's Acceptance**: A statement that clearly justifies the date by which the VECP must be accepted to obtain the maximum price reduction, noting any effect upon the Contract Time(s) and/or Contract Milestone(s). This statement must include a narrative that demonstrates the most recent construction schedule has been utilized to justify that proposed acceptance date (e.g. "in order to start to fabricate critical materials, authorization must be provided to work on the shop drawings by no later than [date]"). The Contractor should allow for at least sixty (60) to ninety (90) days for acceptance by MassDOT once all of the VECP documentation has been provided. Acceptance shall mean that MassDOT has received a finalized and executed contract modification. However, this is a proposed Contract change.

   The Contractor is fully obligated to progress the Work of the original Contract and MassDOT is not liable for any delays or costs that may occur in the review phase of any VECP proposal.

5. **Cost and Savings Estimates**: A detailed estimate of the anticipated net savings, calculated as follows:

   a. **Original Scope:** Isolate the cost of performing the original contract construction activities, in accordance with the original Contract Documents, as originally bid by the Contractor, that are anticipated to be superseded by the VECP. This cost is to include any original contract scope that is anticipated to be altered or eliminated by the VECP such as, shop drawing preparation, inspection work, testing, maintenance of traffic, or any other original contract costs, that have yet to have been performed at the time of this VECP submission.

   b. **New VECP Scope:** Calculate the cost of performing the comparable construction activities associated with the VECP.

   c. **Contractor's Engineer & Inspection**: Calculate the cost of engineering, inspection, and design work by the Contractor's Engineer/Designer. This should be a realistic estimate of the costs of any required engineering, design and review work by the Contractor's Engineer.

   d. **MassDOT's Costs:** MassDOT's estimate of costs to perform engineering/design reviews, cost estimate reviews, schedule reviews, and any other administrative costs to review and recommend implementation of the proposed VECP. (including all anticipated increased costs to MassDOT on other Contracts and all anticipated follow-on increased costs to MassDOT, if any) as provided by MassDOT. MassDOT's estimated costs must be included the VECP calculation and will be provided by MassDOT in support of the VECP evaluation process.

   e. **Other Costs:** Estimated costs associated with any revisions to other project related costs, such as Environmental Permits or Right of Way acquisitions, including other agency or municipality costs, as provided by MassDOT.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

Net Savings:
The net savings to be split between MassDOT and the Contractor shall be calculated using the items above as follows: a - (b+c+d+e) = net savings

6. The Contractor shall also provide:

   a. A proposed Change Order, which explains and justifies any required Equitable Adjustment in the Contract Price.

   b. The Contractor's actual costs expended for developing the VECP as of the date of the VECP submission;

7. **Design Changes and Drawings:** The costs that are outlined above should be inclusive of the following design and engineering responsibilities.

   a. Design changes shall be prepared and stamped by the Contractor's professional designer and/or engineer. In addition, in the development of the VECP; the Contractor is responsible for anticipating and managing all aspects associated with any VECP design work that must be performed by a licensed Engineer.

   b. The Contractor's engineer must analyze and stamp all components of any aspect of the project that has been redesigned, changed, or altered as a result of this VECP.

   c. The Contractor's engineer shall provide all calculations and supporting design/engineering documentation that was utilized to develop the changes and stamped drawings. These will be used by MassDOT's Designer-of-Record to review the VECP changes. The Contractor is limited to selecting only those engineer's that have been pre-qualified by MassDOT's A&E Board.

   d. MassDOT's Designer-of-Record will review and respond to all completed design submissions related to this VECP within thirty (30) calendar days, unless determined to be a non-critical path item.

   e. MassDOT will be responsible for estimating and managing MassDOT's Designer-of-Record during the VECP review and implementation. Should any significant conflicts arise, between the Contractor's Engineer and MassDOT's Designer-of-Record, the DOT and the Contractor will work expeditiously to resolve the conflict. Should this type of conflict continue for greater than five (5) days, the Contractor is to bear all financial and time related impacts of such delay and must seek to resolve the design conflict, in an acceptable manner to MassDOT. The resolution of this conflict will be funded at the Contractor's expense – exclusive of the net saving that was agreed to at the execution of the contract modification for this VECP.

   f. The Contractor's Engineer may also be required to inspect the construction work. The Contractor is to include such anticipated inspection costs in the initial VECP.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

g. MassDOT's Designer of Record will remain the Designer-of-Record for the entire Project. Any costs incurred in the use of MassDOT's Designer-of-Record by MassDOT or Contractor associated with the review of a VECP are to be included in the calculated net savings.

C. Approval of the VECP shall not occur until a Contract Modification, incorporating the VECP, is issued by MassDOT and properly executed by the Contractor. MassDOT may accept or reject part or all of any VECP at any time prior to an executed Contract Modification for the applicable VECP. The decision of MassDOT, concerning acceptance or rejection of any VECP, shall be final and shall not be subject to dispute resolution.

It is expected that several weeks may go by before the final VECP documentation has been executed with a Contract Modification. Therefore, MassDOT intends to make certain that the initial cost estimate information has not changed before entering into a Contract Modification. As the VECP evaluation process is finalized, and prior to the signed Contract Modification for the VECP, the Contractor and MassDOT must re-certify the current status of the originally proposed cost and/or schedule savings.

Until a contract modification is issued and schedule and cost/savings re-certification is complete and accepted by MassDOT, the Contractor shall remain obligated to perform the Work in accordance with the terms and conditions of the original Contract Documents.

Upon completion of the work associated with the VECP, MassDOT may require verification that the VECP savings has been achieved.

D. VECPs will be processed (distributed, reviewed, commented upon, accepted or rejected) expeditiously (pursuant to M.G.L. c. 30, § 39R); however, as this is an elective modification to the contract, MassDOT shall not be liable for any delay or cost in the review and acceptance of the VECP. During the review of the VECP, the Contractor remains obligated to progress the original Contract scope, and schedule, as planned; until a Contract Modification, accepting the Contractor re-certified VECP, has been executed by MassDOT.

The Contractor has the right to withdraw part, or all of any VECP, prior to acceptance by MassDOT. Such withdrawal shall be made in writing to the Engineer. The Contractor shall state the period of time, from the date of the initial VECP submittal, that the VECP shall remain valid and feasible. Revision of this validity and feasibility period shall be allowed only by mutual agreement of the Contractor and the Engineer in writing.

If the Contractor desires to withdraw the proposal prior to the expiration of this period for non-technical reason, MassDOT reserves the right to recover all actual costs that have been incurred to MassDOT.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

If the Contractor withdraws the VEC Proposal, MassDOT reserves the right to proceed with the VECP or any portion of the VECP as a normal change and the Contractor waives any right it may have had to share in net savings thereunder.

For purposes of this provision, expiration of the time established by the Contractor for approval shall be considered as withdrawal by the Contractor if MassDOT requests an extension of that time and the Contractor does not provide a written extension.

E. With regard to unknown conditions or sub-surface work, in general, the expectation is that the Contractor and MassDOT will strive to gain enough knowledge about the risks in order to provide a forward-priced Change Proposal. Therefore, any costs to fully evaluate the proposal, such as additional borings and/or test pits, must be considered in the cost evaluation of whether the VECP is worth pursuing. However, if it is impractical to gather conclusive exploratory information, before the VECP is executed, MassDOT may consider provisions in the VECP that clearly identifies the risk sharing (cost and time) related specifically to the unknown/sub-surface conditions. If these VECP provisions are acceptable to MassDOT they are to include supplemental language to provide a determination of the final savings/cost, and time impacts, no later than 45 days after the sub-surface work is completed. All other aspects of the VECP, unrelated to these Provisions, will be binding upon execution of the VECP.

NOTIFICATION OF FUNDING SOURCES FOR WORK TO BE PAID BY OTHERS

This contract contains work that shall be paid by the Town of Provincetown**.** The said Town shall be responsible for construction costs associated with a Non-Participating Agreement with MassDOT.

NORTHERN LONG-EARED BAT AND TRICOLORED BAT PROTECTION

The northern long-eared bat (Myotis septentrionalis; NLEB) and tricolored bat (Perimyotis subflavus; TCB) are listed as federally endangered or proposed endangered, respectfully, under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) developed this guidance to address ESA compliance and promote conservation of NLEB and TCB. MassDOT, on behalf of FHWA, submitted a Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key Consultation through Information for Planning and Consultation (IPaC) and generated a May Affect, Not Likely to Adversely Affect (NLAA) determination (see Document A00855 included herein). Subsequently, the project has completed Section 7 consultation under the ESA.

In advance of the uplisting of the TCB to endangered under the ESA, the following Avoidance and Minimization Measures (AMMs) must be strictly adhered to in order to protect NLEB and TCB and to be in compliance with the ESA. Contact MassDOT Environmental Services - Wildlife Unit Supervisor for questions about project limits, restrictions, or conservation measures.

General AMMs

- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB and TCB, including all applicable AMMs. NLEB and TCB information (https://www.fws.gov/midwest/endangered/mammals/nleb/ and https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus) shall be made available to all personnel.

- On July 28, 2022, Stantec, on behalf of MassDOT Highway Division Environmental Services, conducted a northern long-eared bat summer presence/absence survey, in accordance with the 2022 survey guidelines. The survey did not confirm the presence of NLEB and/or TCB. If work is proposed by the Contractor past July 28, 2027 additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.

Lighting AMMs

- Direct temporary lighting away from suitable habitat during the active season: **March 15 to November 30**

- When installing new or replacing existing permanent lights, use downward-facing, full cut-off lens lights (with same intensity or less for replacement lighting); or for those transportation agencies using the BUG system developed by the Illuminating Engineering Society, be as close to 0 for all three ratings with a priority of "uplight" of 0 and "backlight" as low as practicable.

Tree Removal AMMs

- If additional cutting is proposed by the Contractor that is outside the scope of this contract, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.

Ensure tree removal is limited to that specified in project plans and ensure that contractors understand clearing limits and how they are marked in the field (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits)

ITEM 102.2 TREE TRIMMING LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsections 8.08 and 101 of the Standard Specifications and the following.

The work under this Item consists of removing all living, dead, dying, broken and certain other limbs and branches in areas adjacent to proposed overhead wire relocations, highway lighting, traffic signals, traffic signage, other areas as described on the plans, and as required by the Engineer from trees located within the limits of the Project and the satisfactory disposal of all such removed debris.

Tree trimming shall be done as directed by the Engineer. Any tree trimming for overhead wire relocations shall meet the current requirements of each Utility. Prior to commencing work the Contractor shall verify each location with the Utility Companies.

All pruning and tree work shall be in conformance with the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance.

All tree trimming work within 10 feet of energized power lines and equipment shall be in conformance with the most current version of the United States Department of Labor (DOL) OSHA Standard 1910.269(r) along with subsections (1) through (8).

All work under this Item will be performed or supervised by the Massachusetts Certified Arborist.

The Contractor shall be required to provide a crew, consisting of a bucket truck with operator and grounds man for pruning and removal. The minimum crew shall consist of the following: a supervisor and three tree-trimmers/laborers. The crew shall be equipped with all necessary equipment needed to complete the work including, but not limited to, pickup trucks, chippers, gas powered chain saws, hand saws, loppers, shears, pruners, branch trimmers, ladders, tree-climbing equipment, etc. Fuel for equipment shall also be considered incidental to this Item. The crew shall be OSHA certified as line-clearance tree trimmers in order to work within 10 feet of energized power lines and equipment.

SUBMITTALS

Prior to start of work, the Contractor shall submit to the Engineer the name, certification number and resume of the Massachusetts Certified Arborist referenced herein. Cost for Certified Arborist for all activities pertaining to this Item shall be incidental to this Item.

Incidental to this Item, the Contractor shall provide to the Engineer one (1) copy of the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance, Part 1: Pruning. These references shall be kept by the Engineer at his/her office for the length of the Contract.

Prior to start of work, the Contractor shall coordinate with the MassDOT Landscape Design Section, the Electric Utility Company, and the Utility Company with pole set in the field to confirm number, location, and extent of selective tree trimming.

ITEM 102.2 (Continued)

DESCRIPTION OF WORK

Line-clearance Tree Trimming: Shall be defined as the pruning, trimming, repairing, maintaining, removing, or clearing of trees or the cutting of brush that is near (within 10 feet of) energized power lines.

TREE: Shall be defined as having a diameter of 4 inches or over, measured at a point 3 feet above the average ground.

LIMBS AND BRANCHES: Shall be defined as wood having a diameter of ½ inch or over and wood that has a diameter of less than ½ inch shall be considered a TWIG.

A DYING LIMB OR BRANCH: May have live growth at some point but shall be removed if found to be in an unhealthy condition.

While it is not the intent that every dead, dying and/or broken twig be removed from trees requiring trimming, the tree worker will be required to remove all such twigs accessible in the areas of the tree in which he/she is working.

If required by the Engineer, specific trees or parts thereof which are so located that damage may result from dropping shall be reduced by rope or cable lowering.

Tree shaping may be required on trees, where up-branching done under this Contract has distorted the natural symmetry of the tree. Tree shaping shall consist of the removal of limbs and branches from other locations of the tree where removal is desirable to restore natural symmetry.

All sucker growth on all tree trunks within the limits of the Contract shall be removed from the ground level to the beginning of the main branch system.

Any and all trees, branches, or brush conflicting with utility poles, equipment, overhead wires, and service connections, shall be removed and/or cut back using best practices to satisfy the requirements of all Utilities with an attachment to the pole line.

Any and all branches extending directly below a street luminaire as to limit the light reaching the street or path/sidewalk surfaces shall be removed and all branches shall be cut back to afford a minimum of 5-foot clearance on all sides of the luminaire. The path/sidewalk surface shall be considered as the area from the edge of the roadway surface to the edge of the path/sidewalk surface farthest from the roadway.

By cutting NEARLY, but not quite, flush with the trunk, limb or branch, the "collar" is left at the top of the wound (in the crotch of the union). This will permit the callus growth to cover the wound in a shorter period of time.

BASIS OF PAYMENT

Item 102.2 will be paid for at the Contract unit price per LUMP SUM, which price shall include all labor, certifications, materials, equipment, submittals, and all incidental costs required to complete the work.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

The work under this Item shall conform to the relevant provisions of Subsection 771 of the Standard Specifications and the following:

Tree protection – armoring and pruning shall be used for instances where construction activity (the use of heavy equipment), comes within proximity to potentially damage tree trunk(s) or limbs.

The work shall include the furnishing and installing of temporary tree trunk protection, minor limb pruning, or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities; as shown on the Drawings; and/or as required by the Engineer.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this Item.

MATERIALS

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Material used for trunk armoring or mounting shall be such that installation and removal shall not damage the trunk.

Acceptable trunk armoring materials shall include two by four (2x4) wood cladding, mounted with wire or metal strapping, or when duration of construction activities is less than three months, slotted corrugated plastic pipe, mounted with duct tape. Eight (8) once untreated burlap shall be used to wrap the tree trunk prior to installation of cladding.

Alternative armoring methods or materials may be acceptable if approved by the Engineer.

The height of tree trunk cladding shall be measured from the base of the tree (including root flare) to the bottom of the first branch, or to a height of eight (8) feet, or as may be required by the Engineer.

METHODS OF WORK

Prior to construction activities, the Engineer, Contractor, and the Arborist (if item is included in the contract), shall review trees noted on the Drawings to be protected. Final decision and selection of trees to be armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be maintained such that it is effective for as long as required or replaced when materials are found to be damaged or ineffective, as determined by the Engineer. Replacement, if required, shall be incidental to the work. Armoring shall be removed immediately upon completion of work activities adjacent to the protected tree(s).

ITEM 102.511 (Continued)

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

DAMAGES OR LOSS

If trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described in Item 102.55. The Arborist shall be approved by MassDOT.

If, based on the recommendation of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury; soil compaction remediation; pruning; soil injection fertilization; and/or watering; the damage shall be repaired as soon as possible, within the appropriate season for such work and according to industry standards.

If, based on the recommendation of the Arborist, the Engineer determines that damages are irreparable, or that the damages are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and topsoil filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate tree protection shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per EACH tree to be armored and pruned. This will include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract or as required by the Engineer.

Payment for work under this Item will be scheduled as follows:

- 40% of the value shall be paid upon installation of trunk armoring and completion of pruning work, if required.

- 60% of the value shall be paid at the end of construction operations that would potentially damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

No separate payment will be made for costs of remedial actions, including Arborist services, tree removal, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

ITEM 102.521 TREE AND PLANT PROTECTION FENCE FOOT

The work under this Item shall conform to the relevant provisions of Subsections 644 and 771 of the Standard Specifications and the following:

Work under this Item shall consist of furnishing, installing, and maintaining tree and plant protection fence(s) in a vertical and taut position; removing and resetting fencing as may be required; and final removal of protection fence(s) at the completion of construction activities, or as otherwise required by the Engineer.

The purpose of the fencing is to signify a construction work-free zone and physical barrier, thereby preventing damage to tree roots, tree trunks, soil, and all other vegetation within this delineated Tree and Plant Protection Zone (TPPZ), as shown on the Drawings, as required by the Engineer, and as described herein.

Protection shall be for the duration of the construction activities unless otherwise required by the Engineer.

MATERIALS

Tree and plant protection fence(s) shall provide a minimum forty-eight (48) inch tall barrier, that remains vertical and taut. The Fence shall be orange plastic safety fence (recommended where high visibility is necessary), or wooden snow fencing, or other approved material. Posts and anchoring materials shall be incidental to the work.

Per requirements of the Engineer, additional posts, deeper post depths, and/or additional attachments shall be used if the fabric or fence sags, leans or otherwise is not providing visible or physical protection to the TPPZ.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1, Pruning and Part 5, Construction Management Standard. Provision of reference shall be incidental to this item.

ESTABLISHMENT OF THE TPPZ

Fencing shall be used to delineate and establish the TPPZ, adjacent to construction areas, staging areas, stockpile areas, as shown on the Drawings, and/or as required by the Engineer.

Fencing shall be located as close to the work zone limit and as far from tree trunk(s) and plants as possible to maximize the area to be protected. Fence shall run parallel and adjacent to construction activity to create a barrier between the work zone and the root zone or designated limit of plants and soils to be protected.

ITEM 102.521 (Continued)

When construction activities surround (or have the potential to surround) trees or plants to be protected, a circular enclosure shall be used. In these instances, the TPPZ limit shall be the drip line of each tree or as close as possible to the drip line, and/or as shown on the Drawings. The drip line is defined as the outermost limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer. Activities may including operating, moving, or storing equipment, supplies, or materials; and locating temporary facilities, including trailers or portable toilets, Accessing or traversing the TPPZ shall not be permitted.

METHOD OF WORK

TPPZ fencing shall be installed prior to any construction work or staging activities. Fence(s) shall be repositioned where and as necessary for optimum tree and plant protection. Repositioning shall be incidental to this item. TPPZ fencing shall not be moved without prior approval by the Engineer.

The TPPZ shall be protected at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil with construction materials, debris, silt, fuels, oils, and any chemicals substance.

After construction activities are completed, or when required by the Engineer, fencing, stakes, and other anchoring materials, if any, shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

In the event that grading, trenching, utility work, or storage is unavoidable within the TPPZ, the Engineer shall be notified. Measures may be required for tree protection and preservations, including air spading; the use of six (6) inch depth of wood chips or approved matting for root protection; pruning of branches; and/or trunk protection. These protection measures shall be paid under applicable contract items.

Landscaping work specified within the TPPZ shall be accomplished by hand tools. Where handwork is not feasible, with permission of the Engineer, work shall be conducted with the smallest mechanized equipment necessary.

TREE AND PLANT INJURY OR LOSS

If the TPPZ is encroached by construction activity without approval, at the discretion of the Engineer, the Contractor may be required to provide a more durable barrier (e.g., Jersey Barriers, chain link fence (if not already in use) to secure the area. Costs of furnishing and installing additional or more durable barrier(s) shall be borne by the Contractor.

In such cases of encroachment, soils shall be considered compacted and tree root injury will be assumed. Action shall be taken as specified below.

ITEM 102.521 (Continued)

In the event that trees designated for protection under this item are injured, including root injury from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described under Item 102.55. The Arborist shall be approved by MassDOT.

In the event of spills, compaction or injury, the Contractor shall take corrective action immediately using methods approved by the Engineer, in coordination with the Arborist.

If, based on the recommendations of the Arborist, the Engineer determines that injuries can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering; the injury shall be repaired as soon as possible, within the appropriate season for such work, and according to industry standards.

If, based on the recommendations of the Arborist, the Engineer determines that injuries are irreparable, or that the injuries are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate protection of the TPPZ shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

Shrubs removals from improper or inadequate protection of the TPPZ shall be replaced with plants of similar species and equal size or the largest size plants reasonably available. The Engineer shall approve the size, quality, and quantity of the replacement plant(s). Each replacement shall include a minimum of one year of watering and establishment care, specified under Subsection 771.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Tree and Plant Protection Fence will be measured by the FOOT, complete in place, by the length along the top of the fence.

Tree and plant protection fence will be paid for under the contract unit price per FOOT, complete in place and shall include all materials, labor, and equipment required to furnish, install, anchor, maintain, and remove the fence upon completion, as described herein. Posts, temporary footings, anchoring and removal upon completion, shall be incidental to this item.

No separate payment will be made for costs of remedial actions, including addition of more durable barriers, Arborist services, tree or plant removal, shrub replacement and establishment, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

ITEM 102.521 (Continued)

Payment for work under this item will be scheduled as follows:

- Forty (40) percent of the value payment will be made upon installation of fencing.

- Sixty (60) percent of the value payment will be made when fencing materials have been maintained to function as specified, for the intended duration, and removed and disposed off-site at the completion of protection measure requirement.

ITEM 102.55 ARBORIST HOUR

DESCRIPTION

The work under this Item is for the services of a Certified Arborist. Arborist shall be an International Society of Arboriculture (ISA) Certified Arborist or a Massachusetts Certified Arborist. The Arborist shall have at least 10 years of experience in tree care, including tree protection during construction, and shall demonstrate a familiarity with the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1Pruning, Part 5 Construction Management Standards, and Part 9 Tree Risk Assessment.

The Arborist's general responsibilities include protecting high priority trees within and adjacent to the project limits, stating areas, and access routes; recommending removal of diseased, damaged or otherwise unhealthy trees that pose a potential safety hazard; evaluating effects of construction on future health of trees close to proposed work; and recommending and/or overseeing tree work amd care.

The Arborist for this Item shall not be from the same company as the company responsible for selective clearing or tree removal work.

For projects with multiple phases, projects where construction activities (work or stockpiling) shifts, or when otherwise directed by the Engineer, the Arborist shall re-evaluate conditions and provide follow-up recommendations.

SUBMITTALS

- Contractor shall submit to the Engineer for approval by MassDOT Landscape Design the qualifications and experience of the Arborist. Submittal shall include copy of current certification and a resume summarizing specific construction experience (including relevant MassDOT projects) for a minimum of five projects.
- Arborist's Report documenting recommendations shall be submitted to the Engineer and an electronic copy forwarded to MassDOT Landscape Design Section. Report shall include the following:

SCOPE OF WORK

The Arborist shall be responsible for the following tasks:

- Initial Evaluation and Report
  - recommend and prioritize trees that require removal as appropriate to contract scope, project limits, and project intent;
  - review and modify, if necessary, tree protection measures shown on the drawings
  - review and mark limits of protective fencing for trees and groups of trees to be retained;
  - review and recommend protection measures for high priority trees;
  - submit a marked-up Construction Plan that briefly notes recommendations and decisions made in the field;
  - submit a corresponding report including photo documentation;

ITEM 102.55 (Continued)

- Oversight
  - direct or execute pruning of branches and/or roots, air spading, and/or other tree care operations
- Monitoring and Inspections
  - periodically inspect fencing and ensure root zones are properly protected and clear of equipment and materials as required by the Engineer
  - reevaluate tree protection measures for various phases of a project
  - submit inspection notes with relevant and dated photos to the Engineer.
- Special Care
  - oversee tree pruning for health and aesthetics
  - recommend fertilization and amendments
  - recommend and oversee pest control

METHODS

Prior to any work, the Arborist shall walk the site with the Contractor, the Engineer, the Town Tree Warden, and, if specified, the MassDOT Landscape Architect, to review trees, limits of construction activities, and other concerns. Where required for proper assessment of tree impacts, limits of work shall be staked or otherwise marked in the field prior to the site walk.

Trees to be removed shall be painted or otherwise marked.

Trees to be retained shall be marked such that it does not mar or damage the tree and such that marker is not easily removed. As applicable to the work and scope of the project, trees designated for removal or to be retained shall be noted on the plan and/or in the arborist's report and photographed.

Trees designated to remain that are damaged or removed by construction activities shall be noted and photographed for inclusion in inspection reports submitted to the Engineer.

MEASUREMENT AND BASIS OF PAYMENT

Item 102.55 will be measured for payment by the Hour of time spent onsite.

Item 102.55 will be paid at the *C*ontract unit price per *HOUR* upon submittal and acceptance of Reports described above.

ITEM 120.1 UNCLASSIFIED EXCAVATION CUBIC YARD

The work under this Item shall conform with the relevant provisions of Subsection 120 of the Standard Specification and the following.

The work under this Item shall include all excavation not otherwise included for payment under other items of this Contract, including, but not limited to, the removal and disposal (if necessary) of the following: tree stumps and roots, granite and concrete curbing (not selected for reuse or stacking), edging (not selected for reuse or stacking), hot mix asphalt curbing, rock, pipe, granite, cobblestones, muck, guardrail, fencing and posts, or other materials not otherwise covered in other items of this Contract.

METHOD OF MEASUREMENT

Item 120.1 will be measured for payment by the CUBIC YARD of unclassified excavation.

BASIS OF PAYMENT

Item 120.1 will be paid for at the Contract unit price per CUBIC YARD, which price shall include all labor, materials, tools, saw-cutting, equipment necessary to complete the excavation and disposal of unwanted or surplus material not covered by other items of this Contract, and all incidental costs required to complete the work.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the MassDOT, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection, required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and type of equipment to be utilized.

ITEM 180.01 (Continued)

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, will be measured and paid for at the Lump Sum Bid Price.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

The work shall consist of providing appropriate personal protective equipment (PPE) for all personnel in an area either containing or suspected of containing a hazardous environment.

Contingencies for upgrading the level of protection for on-site workers will be identified in the EHASP and the Contractor shall have the capability to implement the personal protection upgrade in a timely manner. The protective equipment and its use shall be in compliance with the EHASP and all appropriate regulations and/or standards for employee working conditions.

Personal Protection Level C Upgrade will be measured and paid only upon upgrade to Level C and will be at the contract unit price, per hour, per worker, required in Level C personal protection. No payment will be made to the Contractor to provide Level D PPE.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, media (i.e. soils, sediments, surface water and/or groundwater) requiring evaluation and/or management under the Massachusetts Contingency Plan (MCP) may be encountered. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the MCP. These services may include a site walk, field screening, sampling, analysis and characterization of potentially contaminated media, preparation and implementation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the MCP. LSP services shall also be necessary to temporarily move material generated on the project to an off-site storage location.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the Massachusetts Department of Environmental Protection (DEP) shall be submitted for all work assignments listed for the LSP and environmental technicians. Upon approval of the LSP Qualifications, the LSP will be designated as the LSP of Record unless MassDOT designates in writing otherwise. The LSP of Record will serve as the primary point of contact for all hazardous material matters on the project.

The LSP shall evaluate soil and/or sediment with discoloration, odor, elevated field screening results, presence of petroleum liquid or sheen on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment must be pre-approved by the Engineer. The LSP shall ensure proper on-site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect media. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall evaluate the need for confirmatory sampling prior to backfill in areas where contaminated material has been excavated and disposed off-site for compliance with applicable regulatory requirements. The Engineer shall approve the locations of the testing sites prior to the sampling.

ITEM 180.03 (Continued)

Contaminated media shall be handled in accordance with all applicable state and federal statutes, regulations, and policies. The LSP shall adequately evaluate contaminated media for compliance with the requirements of the MCP and Department Policies.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and both shall be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise tabular format which tracks the excavation, stockpiling, analysis and reuse/disposal of all known/suspect contaminated media. These records shall be up-to-date and submitted to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on contaminated media in a tabular format and compare the results to applicable reporting thresholds. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results, evaluation of applicable regulatory exemptions, reporting obligations, and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, damages, and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, damages, and enforcement actions.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

The LSP shall coordinate all activities involving both MassDOT and the DEP through the Engineer. Any notification of release shall be approved by the Engineer before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

ITEM 180.03 (Continued)

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included and are incidental to Items 181.11-181.14.

In order to maintain compliance with the MCP and Department Policies or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. No sampling shall be conducted without prior approval from the Engineer. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

LSP Services for work under this item will be measured per person, per hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The Contractor will be reimbursed upon satisfactory written evidence of payment. The Contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider.

LSP Services will be paid at the Contractor bid price for each hour, or fraction thereof, spent to perform the work as described above. The bid price shall be a blended rate that includes the cost of the LSP, environmental technicians and other personnel, the performance of all work tasks and field screening, including required equipment, materials and instrumentation, and production of all documentation described above. All requests for payment must be accompanied by the following information: the names of the personnel associated with the work charged under LSP Services, dates and hours worked, work conducted, including, where appropriate, locations as identified on the construction plans, and a copy of the field diary for the dates submitted.

Laboratory testing will be reimbursed upon receipt of paid invoices for testing approved by the Engineer.

This item is for LSP work for compliance with the MCP and Department Policies. LSP hours and any laboratory testing related to off-site disposal of excess soil and sediment is incidental to Items 181.11-181.14 (including, but not limited to, disposal characterization, disposal package preparation, landfill acceptance, shipment paperwork preparation, field screening, and tracking).

ITEM 181.11	**DISPOSAL OF UNREGULATED SOIL**	**TON**
ITEM 181.12	**DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY**	**TON**
ITEM 181.13	**DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY**	**TON**
ITEM 181.14	**DISPOSAL OF HAZARDOUS WASTE**	**TON**

The work under these Items shall include the transportation and disposal of contaminated material excavated, or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as "disposal" for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

ITEMS 181.11 through 181.14 (Continued)

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

ITEMS 181.11 through 181.14 (Continued)

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11 through 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

ITEMS 181.11 through 181.14 (Continued)

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including damages and/or fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, must be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is acceptable to MassDOT.

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a baseplan to record this information.

The Sampling Results will be presented in tabular format. Each sample will be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample must also be identified by location (e.g. grid number or stockpile number). For each sample, the following information must be listed: the classification (unregulated, regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

ITEMS 181.11 through 181.14 (Continued)

Each Characterization Report will include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

Excavation and Stockpiling Protocol:
Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:

1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material should not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:
The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition will not begin until the format is acceptable to MassDOT.

ITEMS 181.11 through 181.14 (Continued)

All soils, sediments and demolition debris must be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:
Demolition debris must be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations will be based on the station-offset of the location. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table will also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:
Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table will also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

Method Of Measurement And Basis Of Payment

Disposal of contaminated soil shall be measured for payment by the Ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

ITEM 181.11 Measurement for Disposal of Unregulated Soil shall be under the Contract Unit Price by the weight, in tons, of contaminated materials removed from the site and transported to and disposed of at an approved location or licensed facility, and includes any and all costs for approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.12 Measurement for Disposal of Regulated Soil – In-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved in-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEMS 181.11 through 181.14 (Continued)

ITEM 181.13 Measurement for Disposal of Regulated Soil - Out-of-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved out-of-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.14 Measurement for Disposal of Hazardous Waste shall be under the Contract Unit Price by the weight in tons of hazardous waste removed from the site and transported to and disposed of at the licensed hazardous waste facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS LUMP SUM

The work shall include the inspecting and testing of all materials suspected of containing asbestos. When any demolition is required to enable the inspection and testing of the suspected material it will be considered incidental to this Item and the Contractor must perform all asbestos handling and testing in accordance with the regulations stated below.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during any disturbance of asbestos suspected material. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health and Safety Plan (HASP) may pose a safety hazard to the workers.

The Contractor shall employ the services of a Massachusetts licensed "Asbestos Inspector" to inspect the material to determine whether or not "ITEM 182.2 REMOVAL OF ASBESTOS" is required. Should the asbestos inspector determine laboratory testing is required, a state certified laboratory shall be used to perform all necessary tests.

REGULATIONS

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

ITEM 182.1 (Continued)

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor Standards Regulations, (DLS) including but not limited to:

454 CMR 28.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

BASIS OF PAYMENT

Item 182.1 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work as described and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 182.2 REMOVAL OF ASBESTOS FOOT

The work shall include the removal and satisfactory disposal of existing asbestos. The Contractor's attention is directed to the fact that existing asbestos shall be inspected and tested prior to removal, to determine if special removal and disposal is required. The Contractor shall follow all the rules and regulations stated in "ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS". If asbestos is present, the Contractor shall follow all the rules and regulations stated in the section "REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS", under this item. The Contractor should notify and coordinate his/her efforts with the proper utility accordingly.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

This section specifies the requirements for the handling and removal of asbestos containing material. The Contractor must perform all asbestos handling and removal work in accordance with these specifications and the following additional requirements.

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

ITEM 182.2 (Continued)

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor Standards, (DLS) including but not limited to:

454 CMR 28.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

All asbestos material shall be removed and properly disposed of by a contractor or subcontractor with a current Massachusetts Abatement Contractors License issued by the Department of Labor Standards. Work shall be supervised by a competent person as required by OSHA in 29 CFR 1926 to ensure regulatory compliance. This person must have completed a course at an EPA Training Center or equivalent course in asbestos abatement procedures, have had a minimum of four years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person must also be certified by the Commonwealth as an Asbestos Supervisor and Asbestos Project Designer as required by 454 CMR 28.00.

Asbestos removal work shall be coordinated with all other work under the contract and shall be completed prior to performing any activities which could disturb the asbestos material or produce airborne asbestos fibers.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during trenching and excavation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health and Safety Plan (HASP) may pose a safety hazard to the workers.

ITEM 182.2 (Continued)

NOTIFICATION AND PERMITS

The Contractor shall prepare a formal pre-notification form at least ten (10) days prior to the start of asbestos removal work. This form must be submitted to the appropriate Regional Office of the Massachusetts Department of Environmental Protection and to the U.S. Environmental Protection Agency Region I Air and Hazardous Material Division. A copy of the submitted forms must be provided to the Engineer and kept at the work site.

Prior to starting any work, the Contractor shall also obtain any required asbestos removal permit(s) from the city/town. A copy of the permit(s) must be provided to the Engineer and posted at the work site.

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.

2. Proper protective clothing and respiratory protection prior to entering the work spaces.

3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.

4. Proper exit practices from the work space though the showering and decontamination facilities.

5. Removing asbestos containing material in ways that minimize release of fibers.

6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.

7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.

8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.

9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

ITEM 182.2 (Continued)

REQUIRED SUBMITTALS

The Contractor shall submit to the Engineer the following listed items at least ten (10) calendar days prior to the start of asbestos work. No asbestos removal work activities shall commence until these items are reviewed by the Engineer, unless otherwise waived. Submittals shall be clearly labeled and in sufficient detail to enable the Engineer to form an opinion as to its conformity to the specifications.

1. Name, experience and DLS certification of proposed Supervisors and Foreman responsible for asbestos work.

2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLS, EPA and OSHA standards.

3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.

4. Written plan of action and standard operating procedures (HASP) to include: location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.

5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.

6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.

7. Name, location and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and licenses number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

The Contractor must provide copies of daily inspection and record logs upon request of the Engineer, at any time during project. This information will include but is not limited to work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance and other work applicable activities or reports of accidents or unusual events.

ITEM 182.2 (Continued)

METHOD OF MEASUREMENT

Item 182.2 will be measured for payment by the FOOT for the complete removal and disposal of the asbestos containing material.

BASIS OF PAYMENT

Item 182.2 will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work specified above and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 201.	**CATCH BASIN**	**EACH**
ITEM 202.	**MANHOLE**	**EACH**
ITEM 202.2	**MANHOLE (9 TO 14 FOOT DEPTH)**	**EACH**
ITEM 204.	**GUTTER INLET**	**EACH**
ITEM 205.	**LEACHING BASIN**	**EACH**

The work under these Items shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

This work under these Items shall consist of furnishing and installing or replacing drainage catch basins, manholes, and gutter inlets as directed by the Engineer.

Structures shall conform to the details contained herein and shall be constructed of pre-cast sections. All catch basins shall be constructed as shown in MassDOT Standard Drawing 201.0.2 with a 4-foot sump (deep sump). Catch basins and manholes shall be placed on a 12 inches of crushed stone (M2.01.1) foundation, and shall be set to allow for 3 courses of clay brick between the frame and the structure.

Leaching basins shall be constructed in accordance with MassDOT Construction Standard Details or as otherwise shown on the plans. Each leaching basin shall include a pre-cast drainage structure, crushed stone envelope, and filter fabric as applicable. The Contractor shall take all necessary measures to ensure infiltration capability by maintaining uncompacted, permeable surrounding soils and preventing sediment from entering the structure during and after construction. Leaching basin frames shall be set to grade in the same manner as catch basins, and frames shall be marked "DRAIN" unless otherwise specified.

When utility conflicts are encountered or in the case of shallow pipe inverts, alternate offset corns or flat top sections shall be substituted for conical sections in areas of low cover. Flat top structures shall have a minimum 28-day compressive strength of 4,000 psi, reinforced for AASHTO H-20 loading with ASTM A 615 Grade 60 steel. No additional payment will be made for flat top structures.

Cutting into the cone sections shall not be allowed.

The joints of the precast manhole sections shall be sealed with either a round rubber "O"-ring gasket or a flexible joint sealant. The "O"-ring shall conform to ASTM C443.

All castings located within the pavement area shall not be set to finished grade until after the binder course has been placed.

All frames shall be set in a concrete collar conforming to Construction Standard Drawing 223.0.1 prior to placement of the top course pavement.

Cut and plug of existing utilities in order to replace proposed drainage structures shall be coordinated with utility companies prior the work.

ITEMS 201. through 202.2 and 204. through 205. (Continued)

The manhole casting shall be a standard frame and cover. The word "DRAIN" shall be prominently cast in the top of all sewer manhole covers.

The Contractor shall cut and plug the existing abandoned water main when conflict with the proposed drainage system. Pipe cutting and removal shall be considered incidental to the respective drainage items.

Connections to existing pipe shall be included in the cost of the structures. If existing pipe is to be abandoned, the end of the existing pipe shall be plugged as specified in Section 200. The removal of existing pipe due to conflicts with the proposed drainage structures shall be considered incidental to the cost of the structures. The remaining portion of the existing pipe to remain shall be plugged.

METHOD OF MEASUREMENT

Items 201., 202., 202.2, 204., and 205. will be respectively measured for payment by the EACH drainage structure installed, complete in place regardless of depth.

BASIS OF PAYMENT

Item*s* 201., 202*.,* 202.2*,* 204., and 205. will be paid for at the respective Contract unit price per EACH, which prices shall include all excavation, required sawcutting, shoring, bracing, backfilling, compaction, adjustment, concrete collars, manhole inverts, reducers, rubber boots, and stainless steel strapping, and all labor, materials, and all incidental costs required to complete the work.

Payment for manhole frame and cover, catch basin frame and grate, and gutter inlet frame and grate shall be paid under Item 222.3.

No separate payment shall be made for pipe connections to new structures as required.

Payment for crushed stone bedding foundation when required by the Engineer to replace unsuitable material will be measured and paid under Item 156.

Masonry plugs required for the abandonment of pipe will be paid under Item 227.4.

The Contractor shall cut and plug the existing abandoned utilities when conflict with the proposed structure system installation. Pipe cutting and removal shall be considered incidental to the respective structure installation.

ITEM 203.1 STILLING BASIN EACH

The work under this Item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

The work under this Item shall consist of installing the stilling basin complete as shown in the Drawings and described below.

The structure dimensions shall be as specified in the drawings.

MATERIALS

1. The precast concrete stilling basin shall be constructed of pre-cast concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

    a. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
    b. Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
    c. Cement shall be Type III Portland Cement conforming to ASTM C 150;
    d. Aggregates shall conform to ASTM C 33;
    e. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
    f. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
    g. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

2. Manhole frame and cover shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

CONSTRUCTION METHOD

1. The Contractor shall exercise care in the storage and handling of the stilling basin components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.
2. The Contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.
3. The Contractor shall removal all loose material and pooling water from the stilling basin prior to the transfer of operational responsibility to the Owner.

ITEM 203.1 (Continued)

METHOD OF MEASUREMENT

Item 203.1 will be measured for payment by the EACH stilling basin installed, complete in place.

BASIS OF PAYMENT

Item 203.1 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment, pavement saw cutting and disposal; excavation (except rock and boulder excavation); support of excavation; crushed stone bedding; filter fabric; backfilling with suitable excavated material; removal and disposal of unsuitable excavated material; precast sections and bases, platforms, all appurtenances as required by the manufacturer for installing the product complete per manufacturer requirements, preformed pipe openings all forms, reinforcing, concrete and masonry materials; connection to drain pipes; hydraulic cement; top slabs for shallow manholes if used; compaction and compaction testing; frames and covers; brick and mortar levelling as necessary to bring frame to grade; dewatering including installation and maintenance of dewatering systems during installation operations as required; proper discharge of ground water; and all incidental costs required to complete the work.

ITEM 203.2 OVERFLOW STRUCTURE EACH

The work under this Item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

The work under this Item shall consist of installing the overflow structure complete as shown in the Drawings and described below.

The structure dimensions shall be as specified in the drawings.

MATERIALS

1. The precast concrete overflow structure shall be constructed of pre-cast concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:
    a. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
    b. Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
    c. Cement shall be Type III Portland Cement conforming to ASTM C 150;
    d. Aggregates shall conform to ASTM C 33;
    e. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
    f. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
    g. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

2. Frame and grate shall be as specified in the design drawings. The frame and grate shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

CONSTRUCTION METHOD

1. The Contractor shall exercise care in the storage and handling of the overflow structure components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.
2. The Contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The Contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.
3. The Contractor shall removal all loose material and pooling water from the overflow structure prior to the transfer of operational responsibility to the Owner.

ITEM 203.2 (Continued)

METHOD OF MEASUREMENT

Item 203.2 will be measured for payment by the EACH overflow structure installed, complete in place.

BASIS OF PAYMENT

Item 203.2 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment, pavement saw cutting and disposal; excavation (except rock and boulder excavation); support of excavation; crushed stone bedding; filter fabric; backfilling with suitable excavated material; removal and disposal of unsuitable excavated material; precast sections and bases, platforms, all appurtenances as required by the manufacturer for installing the product complete per manufacturer requirements, preformed pipe openings all forms, reinforcing, concrete and masonry materials; connection to drain pipes; hydraulic cement; top slabs for shallow manholes if used; compaction and compaction testing; frame and grate; brick and mortar levelling as necessary to bring frame to specified elevation; dewatering including installation and maintenance of dewatering systems during installation operations as required; proper discharge of ground water; and all incidental costs required to complete the work.

ITEM 203.3 HYDRODYNAMIC SEPARATOR EACH

The work under this Item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

The work under this Item shall consist of installing the hydrodynamic separators complete as shown in the Drawings and described below.

1. The manufacturer of the hydrodynamic separator shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer.
2. All components shall be subject to inspection by the Engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.
3. The manufacturer shall guarantee the hydrodynamic separator components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of hydrodynamic separator components shall be limited to the application for which it was specifically designed.
4. The hydrodynamic separator manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certification" certifying that each hydrodynamic separator is capable of achieving the specified removal efficiencies listed in these specifications.

MATERIALS

1. The hydrodynamic separator models shall be as listed in the table below, or approved equal.

Structure Name	Hydrodynamic Separator Product	Min. Treatment Rate (cfs)
HDS-201	STC-2400	1.5
HDS-301	STC-900	0.5
HDS-401	STC-900	0.5
HDS-402	STC-900	0.5

For Structure No. HDS-201, the hydrodynamic separator models shall be Contech STC - 2400, Advanced Drainage System (ADS) - BaySeparator S20, Oldcastle Infrastructure – Up-Flo® Filter UF-4, or approved equal.

For Structures HDS-301, HDS-401, and HDS-402, the hydrodynamic separator models shall be Contech STC 900, Advanced Drainage System (ADS) - BaySepartor S10, Oldcastle Infrastructure Vortechs® Model VT-1, or approved equal.

ITEM 203.3 (Continued)

2. The housing unit of the stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:
    a. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
    b. Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
    c. Cement shall be Type III Portland Cement conforming to ASTM C 150;
    d. Aggregates shall conform to ASTM C 33;
    e. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
    f. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.
    g. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

3. Internal Components and appurtenances shall conform to the following:
    h. Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;
    i. Fiberglass components shall conform to applicable sections of ASTM D-4097
    j. Access system(s) conform to the following: Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.
    k. An aluminum safety grate shall be installed within the chamber of the unit.

4. The hydrodynamic separator device shall remove oil and sediment from stormwater during frequent wet weather events and retain these pollutants within the device for later removal.

5. The hydrodynamic separator device shall be engineered, designed and sized to treat a minimum of 90 percent of the annual runoff volume using a widely accepted continuous simulation runoff model which uses rainfall data records which includes antecedent conditions as well as rainfall periods. Rainfall records should be comprised of 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases at least a minimum of 5-years continuous rainfall.

6. The hydrodynamic separator device shall be capable of removing the Engineer-specified total suspended solids (TSS) load, without scouring previously captured pollutants.

CONSTRUCTION METHOD

1. The Contractor shall exercise care in the storage and handling of the hydrodynamic separator components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the Contractor.

ITEM 203.3 (Continued)

2. The hydrodynamic separator shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours' notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

3. The Contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The Contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner which leaves no sharp points or edges.

4. The Contractor shall removal all loose material and pooling water from the hydrodynamic separator prior to the transfer of operational responsibility to the Owner.

METHOD OF MEASUREMENT

Item 203.3 will be measured for payment by the EACH hydrodynamic separator installed, complete in place.

BASIS OF PAYMENT

Item 203.3 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment, labor, materials, equipment, pavement saw cutting and disposal; excavation (except rock and boulder excavation); support of excavation; crushed stone bedding; filter fabric; backfilling with suitable excavated material; removal and disposal of unsuitable excavated material; precast sections and bases, platforms, all appurtenances as required by the manufacturer for installing the product complete per manufacturer requirements, preformed pipe openings all forms, reinforcing, concrete and masonry materials; hydraulic cement; top slabs for shallow manholes if used; compaction and compaction testing; frames and covers; brick and mortar levelling as necessary to bring frame to grade; dewatering including installation and maintenance of dewatering systems during installation operations as required; proper discharge of ground water; and all incidental costs required to complete the work.

ITEM 203.4 WATER LEVEL MONITORING SYSTEM LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsections 201 and 900 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing, installing, testing, and commissioning a water level monitoring system for the continuous measurement and remote telemetry of surface water elevation at the detention basin located at the intersection of Shank Painter Road and Route 6, as shown on the Drawings and/or as directed by the Engineer.

The monitoring system shall utilize a **non-contact radar level transmitter** designed for outdoor environmental conditions and capable of accurately measuring water surface elevation without submergence. The transmitter shall be integrated with a **cellular-based wireless telemetry unit** capable of transmitting real-time and historical water level data to a secure, cloud-based data management platform accessible by the Owner and Engineer.

The system shall be mounted on a **steel or cast iron post**, securely anchored in accordance with the manufacturer's recommendations and as approved by the Engineer. The installation shall be positioned to ensure reliable measurement of detention basin water levels under all anticipated operating conditions.

The purpose of this monitoring system is to provide real-time water level data at the detention basin to support and coordinate operations with the proposed pump station at Court Street under a separate project. The Contractor shall coordinate with the Engineer, the Town of Provincetown, and the Court Street pump station contractor for installation location, mounting elevation, and system configuration to ensure compatibility with the pump station monitoring and control requirements.

All equipment, materials, telemetry services, data access, and appurtenances necessary for a complete and fully functional system shall be included under this Item.

MATERIALS

The system shall include, at a minimum:

- Non-contact radar water level transmitter
- Cellular wireless telemetry unit with battery power
- Enclosure and mounting hardware
- Cellular data plan and cloud connectivity
- Startup, configuration, and calibration services

The system shall be suitable for outdoor installation and continuous operation containing the following components:

1. RADAR WATER LEVEL TRANSMITTER

A 2-wire non-contact radar level transmitter designed for surface water monitoring applications such as ponds, basins, channels, or manholes.

ITEM 203.4 (Continued)

Performance Requirement:

- Measurement Range: Minimum 26 feet
- Resolution: 0.039 inches
- Accuracy: ±0.079 inches
- Repeatability: 0.039 inches
- Beam Angle: Maximum 6 degrees
- Stable Measurement Time:
  - Cold Boot: ≤10 seconds
  - Warm Boot: ≤5 seconds

Operating Characteristics:

- Operating Frequency: V-band (approximately 63 GHz)
- Measurement Method: FMCW (Frequency Modulated Continuous Wave)
- Near-Blanking Distance: Maximum 75 mm from sensor face

Construction Method:

- Sensor Body Material: Valox , Vega, Geolux, or approved equal. "
- Mounting:
  - Rear: 1-inch stainless steel NPT thread
  - Optional Front: 1.5-inch NPT thread
- Environmental Rating: IP68 / NEMA 6P
- Operating Temperature: -40°F to +176°F

Electrical and Communication:

- Power Supply: 12–24 VDC
- Output Signal: 4–20 mA with HART communication
- Local Wireless Communication: Encrypted Bluetooth for configuration
- Visual Indicator: Local LED status indication compliant with NAMUR standards

Safety and Approvals:

- Intrinsically safe for hazardous locations
- Certified for Class I, II, and III, Division 1, Groups A–G
- Additional certifications: FCC, FM, ATEX/IECEx (as applicable)

2. WIRELESS TELEMETRY AND DATA TRANSMISSION

A cellular-based wireless telemetry unit capable of transmitting sensor data to a cloud-hosted platform without external power.

Functional Requirements:

- Plug-and-play integration with radar level transmitter
- Support for analog (4–20 mA), HART, and Modbus inputs
- Configurable data reporting intervals
- Secure encrypted data transmission

ITEM 203.4 (Continued)

Cellular Communication:

- Cellular Technology: LTE Cat-M1 / NB-IoT (auto-selectable)
- SIM Type: 4FF SIM
- Carrier: Verizon, Eversource, Comcast, or approved equal
- Data Protocols: MQTT / Sparkplug-B
- Secure Communication: TLS encryption

Power:

- Power Source: Internal battery pack
- Battery Type: 4 D-cell pack
- Battery Life: Up to 8 years depending on reporting interval

Environmental Requirements:

- Operating Temperature: -40°F to +185°F
- Humidity: 0–100% condensing
- Safety Rating: Class I, Division 2, Groups A, B, C, D, T5

CLOUD PLATFORM AND DATA ACCESS

Provide a cloud-based data hosting and visualization services for real-time and historical water level monitoring as following:

- Web-based user access
- Secure login credentials
- Configurable alarm thresholds
- Data export capability
- Minimum 3-year cellular data plan included

CONSTRUCTION METHODS

The Contractor shall install the water level monitor system at locations shown on the plans or as directed by the Engineer. The water level monitor system shall be mounted securely to a 6" diameter concrete filled steel or cast iron pipe on a concrete footing. All wiring shall be concealed and protected from tampering or environmental damage.

The Contractor shall coordinate with The entire assembly shall be tested and demonstrated for functionality in the presence of the Engineer.

SUBMIITALS

The Contractor shall submit shop drawings and manufacturer's cut sheets for approval prior to procurement.

BASIS OF PAYMENT

Item 203.4 will be paid for at the Contract unit price per LUMP SUM, which price shall include all items necessary to install and operate the water level monitoring system, submittals, labor, materials, equipment, steel or cast iron pipe, concrete foundation, appurtenances necessary for a complete and functioning installation, and all incidental costs required to complete the work.

ITEM 205.5 INFILTRATION CHAMBERS FOOT

The work under this Item shall conform to the relevant provisions of Subsection 201 of the Standard Specifications and the following:

The work under this Item shall consist of installing the infiltration chambers complete as shown in the Drawings and described below.

The infiltration chambers shall be manufactured by Cultec Recharger 150 XLHD, Advanced Drainage System (ADS) StormTech Chambers, Contect Engineered Solutions Chamber Maxx, or approved equal. The array design includes 10 rows of seven chambers each, for a total of 70 chambers. An approved equal shall meet the following minimum requirements:

1. Maximum infiltration chamber structure height shall be 18.5 inches.
2. Total footprint of infiltration chamber array shall not exceed 75-ft by 34-ft.
3. Combined storage volume, including crushed stone around the infiltration structure, shall be a minimum of 3,728 CF.
4. Chambers shall all be interconnected and set at the same elevation.
5. The chamber shall be manufactured in an ISO 9001:2015 certified facility.
6. The chamber shall be designed and manufactured to meet the material and structure requirements of IAPMO PS 63-2019, including resistance to AASHTO H-10 and H-20 highway live loads.
7. 6” diameter inspection ports shall be set every 30’ along the length of the infiltration chambers.

Non-woven geotextile fabric shall be Cultec No. 410, Solmax Mirafi Nonwoven Geotextile 140N, Propex GeoSolutions Geotex Nonwoven Geotextiles Geotex 401, or approved equal.

1. Geotextile weight shall be 4.5 oz./SY
2. Tensile strength shall be 120 lbs per ASTM D4632 testing method.
3. Elongation @ break shall be 50% per ASTM D4632 testing method.
4. Mullen burst value shall be 225 PSI per ASTM D3786 testing method.
5. Puncture strength shall be 65 lbs per ASTM D4833 testing method.
6. CBR puncture value shall be 340 lbs per ASTM D6241 testing method.
7. Trapezoidal tear value shall be 50 lbs per ASTM D4533 testing method.
8. AOS value shall be 70 US sieve (0.212mm) per ASTM D4751 testing method.
9. Permittivity shall be 1.7 cen-1 per ASTM D4491 testing method.
10. Water flow rate value shall be 135 gal/min/SF per ASTM D4491 testing method.
11. UV stability at 500 hours shall be 70% per ASTM D4355 testing method.

Woven geotextile fabric shall be Cultec No. 4800, Solmax Mirafi Woven Geotextile HP-Series, Propex GeoSolutions Geotex woven Geotextiles Geotex 801, or approved equal.

1. The geotextile shall have a tensile strength of 550 x 550 lbs per ASTM d4632 testing method.
2. The geotextile shall have a elongation @ break resistance of 20 x 20% per ASTM d4632 testing method.
3. The geotextile shall have a wide width tensile resistance of 5,070 x 5,070 lbs/ft per ASTM d4595 testing method.
4. The geotextile shall have a wide width tensile resistance @ 2% strain of 960 x 1,096 lbs/ft per ASTM d4595 testing method.
5. The geotextile shall have a wide width tensile resistance @ 5% strain of 2,740 x 2, 740 lbs/ft (per ASTM d4595 testing method.

ITEM 205.5 (Continued)

6. The geotextile shall have a wide width tensile resistance @ 10% strain of 4,800 x 4,800 lbs/ft per ASTM d4595 testing method.
7. The geotextile shall have a CBR puncture resistance of 1,700 lbs per ASTM d6241 testing method.
8. The geotextile shall have a trapezoidal tear resistance of 180 x 180 lbs per ASTM d4533 testing method.
9. The geotextile shall have an apparent opening size of 40 us std. Sieve (0.425 mm) per ASTM d4751 testing method.
10. The geotextile shall have a permittivity rating of 0.15 sec-1 per ASTM d4491 testing method.
11. The geotextile shall have a water flow rating of 11.5 gpm/ft2 per ASTM d4491 testing method.
12. The geotextile shall have a UV resistance of 80% @ 500 hrs. per ASTM d4355 testing method.

CONSTRUCTION METHOD

The installation method shall be in accordance with the manufacturer's requirements.

METHOD OF MEASUREMENT

Item 205.5 will be measured for payment by the FOOT of infiltration chambers installed, complete in place. Measurement for length will be along the horizontal centerline of the infiltration chambers. Measurement will be along the centerline of each row of each cluster of infiltration chambers as approved by the Engineer. Connecting pipes or feed connectors will not be measured for separate payment. No payment will be made for unused materials or infiltration chambers on site but not installed, complete in place.

BASIS OF PAYMENT

Item 205.5 will be paid for at the Contract unit price per FOOT, which price shall include all stormwater infiltration chambers; feed connectors and connection to stormwater infiltration chambers; inspection ports including all fittings, concrete collar, cast iron frame and cover, cap, assembly and connection to stormwater infiltration chambers; all crushed stone backfilled around the infiltration chambers as shown on the design drawing details; all woven and nonwoven geotextiles or filter fabric as shown on the drawings or required by the manufacturer; connections to drain pipes; excavation (except rock and boulder excavation) support of excavation; bedding; backfilling with suitable excavated material; removal and disposal of unsuitable excavated material; compaction and steel plating prior to final paving; subbase; dewatering systems, proper discharge of ground water; providing cutting and disposal of existing pavement; restoring the trench surface to grade needed for trench pavement; all restoration required within the trench limits; protection of existing utilities and structures; laying, jointing, cleaning and testing the chambers; water for construction; temporarily plugging open ends and bracing the plug; fittings; compaction testing; and all incidental work, including; removal and disposal of excess excavated material from the jobsite; and all incidental costs required to complete the work.

ITEM 220.6 SANITARY STRUCTURE REBUILT FOOT

The work under this Item shall conform to the relevant provisions of Subsections 201 and 220 of the Standard Specifications and the following:

The work under this Item consists of rebuilding of sanitary structures to the limits required as shown on the plans or as required by the Engineer. The concrete collar shall be brought up only to a level that will allow the full depth of pavement top course to be placed, as shown on MassDOT Standard Construction Detail 223.0.1.

When the line or grade or both the line and grade of the structure changes by 6 inches or less, the structure shall be adjusted to line and grade.

Brick and/or block masonry, up to the bottom of the casting that indicates deterioration, in the judgment of the Engineer, shall be removed and replaced in kind in accordance with Subsection 220. The above replacement shall be sprayed with liquid penetrant sealant conforming to the requirements of Subsection M9.15.0. This solution shall be applied to both the interior and exterior of the structure to ensure complete protection of all new mortar. Backfill around the structures shall consist of suitable material, thoroughly compacted with mechanical devices.

METHOD OF MEASUREMENT

Item 220.6 will be measured for payment by the FOOT of sanitary structure rebuilt measured by the average height in feet, vertically to the nearest 1/10 ft, from the bottom of rebuilt masonry to the bottom of the casting.

BASIS OF PAYMENT

Item 220.6 will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, excavation, backfill, removal and resetting of the casting to the required grade, construction of concrete collars as shown on the Construction Standards Plate 223.0.1, and incidental costs required to complete the work.

ITEM 220.8 SANITARY STRUCTURE REMODELED EACH

The work under this Item shall conform to the relevant provisions of Subsection 220 of the Standard Specifications and the following:

The work under this Item consists of remodeling of sanitary structure as shown on the plans or as required by the Engineer.

When the line or grade or both the line and grade of the structure changes by more than 6 in. the structure shall be remodeled

The work under this Item shall include all necessary excavation of the existing pavement, cement concrete collars and earth material to obtain access to the masonry and removal of the casting, backfill and compaction and hot mix asphalt of the excavated area.

Backfilling shall consist of suitable material thoroughly compacted with mechanical devices. Any structure that is in the paved roadway, and is not to the point of being backfilled and the collar installed at the end of any work day, shall be steel-plated or backfilled with compacted gravel, level with the roadway. Cost for the gravel and the re-excavation of the gravel to complete the work shall be included in the cost of the structure or item of which it forms a part.

Excavated holes shall be cut in the pavement in a neat manner with an approximate vertical face. All excess excavated materials and construction debris shall be removed and disposed of the site.

All frames and other castings shall be set in a concrete collar conforming to Standard Construction Detail 223.0.1 prior to placement of top course. The concrete collar shall be composed of 4000 PSI, 1 1/2 Inch. 565 High Early Strength Concrete. All frames shall be set on a minimum of two courses of mortared brick or precast grade rings as specified in the Standard Specifications. The concrete collar shall be constructed to allow the full depth of the top course of hot mix asphalt to be placed. The collar shall be completely coated with (RS-1H) Asphaltic Emulsion before placement of hot mix asphalt. Cost of all such work shall be included in the cost of the structure or item of which it forms a part.

The brick for sanitary structures shall be sound, hard and uniformly burned brick, regular and uniform in shape and size, of compact texture and satisfactory to the Engineer. Brick shall comply with ASTM Standard Specifications for sewer brick (made from clay or shale), Designation C-32-63 or Grade SA, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight. Rejected brick shall be immediately removed from the work and substituted with approved brick.

METHOD OF MEASUREMENT

Item 220.8 will be measured for payment by the EACH sanitary structure remodeled, complete in place.

BASIS OF PAYMENT

Item 220.8 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment, excavation, backfill, disposal, sawcutting, and all incidental costs required to complete the work.

ITEM 222.3 FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD EACH
ITEM 223.1 FRAME AND GRATE (OR COVER) REMOVED AND STACKED EACH

The work t under these Items shall conform to the relevant provisions of Subsections 201 and 220 of Standard Specifications and the following:

The work under Item 222.3 consists of furnishing new frame and grate or cover (for manholes) on all new catch basins, gutter inlets, leach basins, and manholes using Municipal Standard as shown on the plans or as directed by the Engineer.

The work under Item 223.1 includes removing and stacking of the existing frames, grates, and covers on all existing drainages and sanitarys structures to be abandoned or removed shall be carefully removed and satisfactorily stored for stacking later to the Town's DPW facility at 26 Alden St, Provincetown, MA. The Contractor shall be held responsible for the removal and handling without damage to the castings and for the protection of the castings during the storage period. Any frames, covers or grates lost or damaged shall be replaced by the Contractor at no additional compensation

MATERIAL

Frames and Grate or Cover – Municipal Standard

a. Municipal catch basin or sewer/drain manhole frames and grates or covers (for manhole installed in the roadway) shall conform to ASTM A48, Class 30.

b. Municipal Standard catch basin frames and grates (for catch basins installed within streets with curb/curb inlets) shall be East Jordan Foundry; Mechanics Iron Foundry; Neenah Foundry or approved equivalent meeting the specifications of MassDOT Standard Detail No. 222.0.2.

c. Manhole covers shall have a diamond pattern, pickholes and the word "SEWER" or "DRAIN" cast in 3-inch letters. Manhole frame and covers shall be East Jordan Foundry; Mechanics Iron Foundry; Neenah Foundry or approved equivalent meeting the specifications of MassDOT Standard Detail No. 221.0.1.

Manhole covers shall be cast into the cover with the appropriate word "DRAIN" or "SEWER".

METHOD OF MEASUREMENT

Item 222.3 will be measured for payment by the EACH frame and grate (or cover) municipal standard delivered to the site,

Item 223.1 will be measured for payment by the EACH frame and grate (or cover) removed and stacked.

BASIS OF PAYMENT

Item 222.3 and 223.1 will be paid for at the respective Contract unit price per EACH, which prices shall include all labor, materials, equipment, loading, unloading, removing, stacking, storage, transportation, and all incidental costs required to complete the work.

The installation of the frame and grate or cover will be paid for under the respective drainage or sewer structure items.

ITEM 245.16 16 INCH POLYVINYL CHLORIDE C900 PIPE FOOT

The work under this Item shall conform to the relevant provisions of Subsections 230 and 259 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and installing Polyvinyl Chloride (PVCO) pressure pipe (force main), pipe fittings and specials, jointing and encasement materials, and accessories, of various sizes, classes, joints and types, and appurtenant work, as shown on the drawings and/or as directed by the Engineer.

REFERENCES

1. ASTM D2241 – Specification for Polyvinyl chloride (PVCO) Plastic Pipe (SDR-PR).

2. ASTM F477 – Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

3. ASTM D2444 – Standard Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).

4. ASTM D2412 – Standard Test Method for External Loading Properties of Plastic Pipe by Parallel – Plate Loading.

5. ASTM D3139 – Standard Specifications for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

6. ASTM D3212 – Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

7. ASTM D1869 – Standard Specification for Rubber Rings for Asbestos-Cement Pipe.

8. AWWA A21 – Ductile Iron Pipe and Fittings.

9. AWWA C909 – Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 in. through 24 in.

SUBMITTALS

1. Submit specifications and shop drawings for materials and equipment furnished under this Section.

2. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein.

QUALITY ASSURANCE

1. Each type of PVC pipe and fittings shall be from a single manufacturer.

ITEM 245.16 (Continued)

2. Inspection of the pipe will also be made by the Engineer or the Town of Provincetown after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job site.

MATERIALS

1. PVC pipe shall be certified by the national sanitation foundation.

2. Pressure Pipe:
   a. Polyvinyl Chloride pressure pipe shall be of a manufacturer who can demonstrate at least 5-years of experience in the manufacture of polyvinyl chloride pipe for use in potable water systems. The pipe shall be "Ultra Blue" C909 PVCO Pipe as manufactured by JM Eagle, Westlake Pipe & Fittings - AquaMax C900 IB PVCO Pipe, IPEX - Bionax PVCO (CIOD), or approved equal.

   b. Polyvinyl Chloride (PVCO) pressure pipe shall be of the size indicated on the plans and shall conform to the requirements of the AWWA C909 Standards for PVC909 DR 18 (PC 235 psi) Pressure Pipe for Water with ductile iron pipe equivalent outside diameters and ASTM F1483 specifications. Joints shall use elastomeric gaskets and be in accordance with ASTM D3139. Gaskets shall conform to ASTM F477.

   c. The standard laying length shall not exceed 20 feet. The minimum "pipe stiffness" (load divided by change in inside diameter in direction of load application) at 5% deflection shall be at least 46 psi for pipe tested in accordance with ASTM Specifications D2412.

   d. Bends shall be constructed of ductile iron in accordance with AWWA A21.10 and A21.53, with mechanical joint ends.

   e. Mechanical joint restraints for AWWA C909 PVC Pipe shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. The restraint devices shall be coated with MEGA-BOND or approved equal. The combination of the restraint(s) and fasteners shall have a pressure rating to the full pressure rating of the pipe. The restraint shall have a two to one safety factor

   f. A split serrated ring shall be used to grip the plain-end of the pipe, a sufficient number of bolts shall connect the restraint ring to the ductile iron fitting. The restraint for mechanical joint fittings shall be EBAA Iron, Inc. Series 19MJ00 , Ford Meter Box Company - Uni-Flange Series 1390, Romac Industries - Romagrip RG Series, or approved equal. or approved equal. The mechanical joint restraint shall be manufactured in the United States and meet the standards for American Iron and Steel (AIS) Certification.

   g. Pipe shall be clearly marked on the outside indicating the name of the manufacturer, nominal diameter, and the ASTM or AWWA designation or both for the DR18 Polyvinyl Chloride Pressure Pipe.

ITEM 245.16 (Continued)

CONSTRUCTION METHODS

Handling Pipe and Fittings

1. Take care in loading, transporting, and unloading to prevent injury to the pipe. Do not drop pipe or fittings. Examine pipe and fittings before installing, and no piece shall be installed that is found to be defective.

2. If any defective pipe is discovered after it has been installed, remove and replace it with a sound pipe in a satisfactory manner. Thoroughly clean pipe and fittings before installing, keep clean until they are used in the work, and conform to the lines, grades and dimensions required when installed.

3. Pipe ends requiring cutting shall be cut square without damage to the remaining pipe. Bevel cut pipe ends 1/8 inch at approximately 30 degrees to provide proper assembly of the joint. Beveling can be done with a coarse file or portable grinder.

4. Support stored pipe from below at not more than 3 foot intervals to prevent deformation. Do not stack pipe higher than 6 feet. Store pipe and fittings in a manner which will keep them at ambient outdoor temperatures. Provide temporary shading as required to meet this requirement. Simply covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted.

Installation

1. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length. If a piece of pipe fails to meet this required check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

2. Pipe shall be hoisted with mechanical equipment using cloth belt slung or continuous fiber rope which avoids scratching pipe. Chain or metallic slings are not allowed.

3. Install piping and fittings true to alignment and grade. If necessary, each length of pipe shall be cleaned out before installation.

4. Excavation, trenching and back filling procedures shall be in accordance with Subsection 230 of the Standard Specifications.

5. Dense graded stone bedding for the pipe shall be in accordance with Subsection 259 of the Standard Specifications.

   Install PVC pipe on a bed of dense graded stone with a minimum depth of 6 inches. The dense graded stone shall completely encase the pipe and cover the pipe to a grade 6 inches over the top of the pipe for the entire width of the trench. Bell holes shall be made in a dense graded stone such that the pipe shall be uniformly supported throughout the entire length of the barrel section.

ITEM 245.16 (Continued)

6. Deflections in Pipe Alignment

a. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint, and shall be approved by the Engineer.

b. Prior to deflecting the pipeline, the spigot of the pipeline should be marked flush with the bell end to assure that the spigot is not withdrawn excessively as the result of the deflection. After the pipe is deflected, an adequate depth of jointing material must remain on the side where the spigot is away from home and an adequate width of caulking space must remain on the opposite side of the pipe at the face of the bell.

c. The maximum deflection recommended by the manufacturer when using any pipe system must be observed when deflecting a pipeline.

d. In general, all radius curves called for on the Drawings or permitted at the time of construction are to be made using full lengths of pipe. The use of short lengths of pipe and extra joints in order to make a smaller radius turn will not be allowed without the written approval of Engineer.

Unsuitable Laying Conditions

1. No pipe shall be laid in water, in an unsuitable trench or during unsuitable weather conditions.

Testing and Disinfection

1. Prior to pressure and leakage tests, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign materials. This work shall be done with care to avoid damage to the pipe.

2. The Contractor shall submit a plan on the method of testing and chlorinating the pipe for review. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company which will perform the work. Testing of the water main shall not begin until the Contractor's plan has been approved by the Engineer. All testing shall be done in the presence of the Engineer.

ITEM 245.16 (Continued)

3. Testing of Water Main:

a. Pressure and leakage tests will be made by the Contractor in accordance with AWWA C605 to determine that the PVC pipe is structurally safe and free of excess leakage. All equipment, materials and labor for testing shall be furnished by the Contractor. Testing shall be done between valved off sections in approximately 3,000-foot maximum section of the main. All piping and all components in the test section must be restrained. The Contractor shall furnish at his own expense the water needed for all water main testing. The Contractor shall prevent water from entering other parts of the pipeline not subject to testing at all times. Contractor to ensure that air release valves and other venting devices are properly installed and placed in open position when filling pipe with water.

b. Once the pipeline section has been filled at normal pressure and all entrapped air removed from the line, the Contractor shall raise the pressure to 150 pounds per square inch by a special pressure pump taking water from a small tank of proper dimensions for satisfactorily measuring the rate of pumpage into the pipeline. This pressure shall be maintained, within 5 psi, for a minimum of 2 hours during which time the line checked for leaks by the Engineer. Based on an average test pressure of 150 psi, the measured rate of water leakage shall not exceed the following rates in the section under test:

$$Q = \frac{LD\sqrt{P}}{148{,}000}$$

Where: Q = Allowable leakage, gallons per hour
(cannot exceed .83 gph per 1,000 feet of pipe)
S = Length of pipe section tested, feet
D = Nominal pipe diameter, inches
P = Average Test Pressure, in psi

c. Should leakage exceed the rate above, the Contractor shall immediately locate the leak or leaks and repair them at his expense. Pipe shall be flushed and chlorinated when leakage does not exceed above standard. Approval does not absolve the Contractor from his responsibility if leaks develop within the new main or water services (to curb box) later within the warranty period.

Chlorinating and Flushing

1. The Contractor, in accordance with the latest edition of ANSI/AWWA 651 Standard for Disinfecting Water Mains, shall chlorinate and flush the new water main. Chlorinated water to be flushed from the pipeline shall be de-chlorinated as shown on detail drawings or as approved by the Engineer. It shall then be discharged to the nearest storm drain. Chlorinated water shall not be discharged to any natural water body.

ITEM 245.16 (Continued)

2. Prior to chlorination, the Contractor shall properly flush the water mains. In general, flushing shall be performed at a flow rate required to achieve a minimum velocity of 3.0 feet per second, which is approximately 470 GPM in an 8-inch diameter main, 730 GPM in a 10-inch main, 1,060 GPM in a 12-inch main and 1,880 GPM in a 16-inch main. Flushing of the water main, at the above rates, for approximately 20-minutes per 1,000-foot section, will allow for three volume changes. This is a sufficient period of time for successfully cleaning the water main.

3. The Contractor shall chlorinate the water main until the main contains a solution containing 25 mg/L available chlorine. The valves shall then be closed and the chlorinated water allowed to sit in the mains for 24 hours. The main will then be checked to assure the chlorine residual shall be at least 10 mg/L. If less than 10 mg/L is measured, the Contractor shall flush and re-chlorinate the mains at no cost to the Owner. All valves and hydrants shall be operated to insure their proper disinfection. Valves shall be operated to prevent super chlorinated water from entering the existing distribution system. The Contractor shall then flush the mains until clear, clean water is being discharged.

4. Sixteen hours after the main has been flushed of chlorinated water, bacteriological samples (total coliforms and heterotrophic plate count) shall be taken. Water samples shall be taken from corporation stops along the length of the water main as designated by the Engineer. A minimum of two (2) samples shall be taken on each street, or two per 3,000 feet of pipe, whichever is greater. Each sample shall be taken in duplicate, in sterile bottles and sent to a State approved private laboratory for analysis. The Contractor shall perform all necessary work including delivery of samples to a certified laboratory and shall include the cost for sampling and analysis in his bid price. The results of the tests on these samples will determine the acceptance of the work and allow these new mains to be connected to the Town's system. The failure of any sample to pass the laboratory tests shall require the Contractor to reflush and re-chlorinate the mains and resample and test the water until acceptable results are obtained, all at no additional cost to the Owner.

5. If, during construction, trench water has entered the main, or if in the opinion of the Owner's Engineer, excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at 200-foot intervals and shall be identified as to location. Additional sample taps shall be installed and removed at the Contractor's expense.

6. Contractor shall note that work under this Contract shall not be considered complete until the satisfactory installation and testing of the water mains have been completed.

ITEM 245.16 (Continued)

METHOD OF MEASUREMENT

Item 245.16 will be measured for payment by the FOOT of 16 inch polyvinyl chloride C900 pipe installed, complete in place.

BASIS OF PAYMENT

Item 245.16 will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, excavation, backfill, connections, testing, chlorination, submittals, and all incidental costs required to complete the work.

Excavation below 5 feet will be paid under Item 142. Class B Trench Excavation. Pipe bedding will be paid for under Item 156.

ITEM 258.1 STONE FOR DRAINAGE OUTLETS SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsection 258 of the Standard Specifications and the following:

The work under this Item consists of furnishing and installing stone for drainage outlets as shown on the drawings or as required by the Engineer.

Stone for Drainage Outlets shall be used over geotextile fabric at areas designated as splash pads at drainage outlets. See Stone Pipe Ends MassDOT Standard Construction Detail 258.0.1.

Stone for Drainage Outlets shall consist of a protective covering of angular shaped stones laid around drainage outlets to insure protection of the outlet, embankment and existing or proposed water courses.

The stone shall be sound, durable rock, angular in shape. Rounded stones, boulder, sandstone, or similar soft stone or relatively thin slabs will not be acceptable. Each stone shall weigh not less than 10 lbs. or more than 100 lbs. At least 75% of the volume shall consist of stone not weighing less than 60 lbs. each. The remainder of the stones shall be so graded that when placed with the larger stones, the entire mass will be compact with a minimum practicable percentage pf voids and minimum thickness of 12 inches.

Hand placing or rearranging of individual stone by mechanical equipment may be required to the extent necessary to secure the results specified. The larger stones shall be placed directly at the drainage outlet point to prevent erosion and displacement.

Unless otherwise authorized by the Engineer, the stone shall be placed in conjunction with the construction of the drainage outlets and/or embankment with only sufficient lag in construction of the erosion protection as may be necessary to allow for proper construction of the drainage outlet and/or embankment and to prevent mixture of embankment and stone.

METHOD OF MEASUREMENT

Item 258.1 will be measured for payment by the SQUARE YARD of stone for drainage outlets placed, complete in place.

BASIS OF PAYMENT

Item 258.1 will be paid for at the Contract unit price per SQUARE YARD, which price shall include all labor, materials, equipment, clearing the area at and adjacent to the proposed stone pad, and all incidental costs required to complete the work.

ITEM 376.5 HYDRANT - ADJUSTED EACH

The work under this Item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications and the following:

All hydrants designated to be "Adjusted" shall be done so one hydrant at a time. The Contractor shall give at least 48 hours written notice to the Town Fire Department and the Department of Public Works prior to removing any hydrant. Hydrants which will be out of service for more than twenty-four (24) hours shall be replaced by temporary hydrants.

METHOD OF MEASUREMENT

Item 376.5 will be measured for payment by the EACH hydrant adjusted, complete in place.

BASIS OF PAYMENT

Item 376.5 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 381. SERVICE BOX EACH
ITEM 381.3 SERVICE BOX ADJUSTED EACH

The work under these Items shall conform to the relevant provisions of the Subsection 301 of the Standard Specifications and the following:

The work under Item 381.3 shall consist of adjusting service boxes, regardless of size, to conform to the proposed line and grade and replacing existing service boxes, regardless of size, located in driveways or street pavement. Service boxes in street pavement shall have collars. Service boxes in sidewalk areas are not required to have collars.

Service boxes damaged by the Contractor's operations will be replaced with new service boxes by the Contractor at their own expense.

Service boxes found to be inoperable due to no fault of the Contractor as determined by the Town should be replaced under Item 381., regardless of size, with new service boxes in accordance with Town standards.

MATERIALS

Curb Stop Boxes
Curb stop boxes shall be cast iron Buffalo Extension 94E type with recessed lid with brass pentagon bolt and the word "water" cast on top, and adjustable sliding type with arch pattern. Curb stop boxes shall be domestically manufactured Bingham and Taylor, Mueller Co., East Jordan Iron Works, or approved equal.

METHOD OF MEASUREMENT

Item 381. will be measured for payment by the EACH service box installed, complete in place.

Item 381.3 will be measured for payment by the EACH service box adjusted, complete in place.

BASIS OF PAYMENT

Item 381. will be paid for at the respective Contract unit price per EACH, which price shall include all labor, equipment, and materials to install service boxes regardless of size, and all incidental costs required to complete the work.

Item 381.3 will be paid for at the Contract unit price per EACH, which price shall include all labor, equipment, and materials to adjust the service box regardless of size including the removal and disposal of old service boxes not fit for reuse, and installation of new replacement service boxes, and all incidental costs required to complete the work.

ITEM 470.2 HOT MIX ASPHALT BERM, TYPE A - MODIFIED FOOT

The work under this Item shall conform to the relevant provisions of Subsection 472 of the Standard Specifications and the following:

The work under this Item shall include constructing or replacing hot mix asphalt berm Type A - Modified (Cape Cod berm) or in kind, as directed by the Engineer

METHOD OF MEASUREMENT

Item 470.2 will be measured for payment by the FOOT of hot mix asphalt berm, type A - modified installed and/or replaced, complete in place.

BASIS OF PAYMENT

Item 470.2 will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 506.2 GRANITE CURB TYPE VB – SPLAYED END EACH

The work under this Item shall conform to the relevant provisions of Subsection 501 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and installing a splayed end curb to transition from the vertical curb to the sloped granite slope edging, as shown on the plans and as directed by the Engineer,

The splayed end curb shall be six feet in length with a sawn face that shall match the slope of the granite edging.

METHOD OF MEASUREMENT

Item 506.2 will be measured for payment by the EACH granite curb type VB - splayed end installed, complete in place.

BASIS OF PAYMENT

Item 506.2 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment for surface preparation, sawcutting, placement, equipment, supplies, including field verification of the dimensions of the existing curb, berm, or slope edging to which this curb is transitioning to provide a smooth transition, and all incidental costs required to complete the work.

ITEM 507.1 GRANITE CURB TYPE T-100 - CURVED FOOT

The work under this Item shall conform to the relevant provisions of Subsection 501 of the Standard Specifications and the following:

As shown on the plans and as directed by the Engineer, granite curb Type T-100 shall be provided along the outer edge of the truck apron. T-100 curb shall be cut to the appropriate radius as indicated on the plans with ends cut radially to avoid non-uniform joints between segments. Dimensions shall be five inches wide by fifteen inches deep. The edges of the curbing shall be beveled at a slope of 1V:4H with a beveled height of three inches in accordance with the details on the plans.

The granite curb shall be installed to the line and grade as shown on the plans and shall be placed and centered over a 2-foot wide 6-inch depth of gravel borrow thoroughly compacted.

Beveled edge should be clean cut at an angle of 45 degrees along the top. No wind marks or jagged edges will be allowed.

METHOD OF MEASUREMENT

Item 507.1 will be measured for payment by the FOOT of granite curb type T-100 - curved, installed, complete in place.

BASIS OF PAYMENT

Item 507.1 will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment for surface preparation, sawcutting, placement, drilling, dowel installation, equipment, supplies, and all incidental costs required to complete the work.

ITEM 590. CURB REMOVED AND STACKED FOOT

The work under this Item shall conform to the relevant provisions of Subsection 580 of the Standard Specifications and the following:

All existing curb that is removed and not reset within the limits of work shall be removed, delivered, off-loaded and carefully stacked at the Provincetown DPW Maintenance facility located at 24 Race Point Road. The Contractor is required to notify Braden Witt at the Provincetown Department of Public Works a minimum of 48-hours prior to delivery of materials.

METHOD OF MEASUREMENT

Item 590. will be measured for payment by the FOOT of curb removed and stacked, complete in place.

BASIS OF PAYMENT

Item 590. will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 645.172	**72 INCH CHAIN LINE FENCE (PIPE TOP RAIL) VINYL COATED (LINE POST OPTION)**	**FOOT**
ITEM 652.072	**72 INCH CHAIN LINE FENCE END POST**	**EACH**
ITEM 653.072	**72 INCH CHAIN LINE FENCE CORNER OR INTERMEDIATE BRACE POST**	**EACH**

The work under these Items shall conform to the relevant provisions of Subsection 644 of the Standard Specifications and the following:

The work under these Items shall consist of furnishing and installing chain link fence on top of the prefabricated modular (PM) block gravity retaining wall as shown on the plans or as required by the Engineer.

The Contractor shall install chain-link fence following the prefabricated modular retaining wall manufacturer's requirements.

METHOD OF MEASUREMENT

Item 645.172 will be measured for payment by the FOOT of 72 inch chain link fence (pipe top rail) vinyl coated (line post option) installed, complete in place.

Items 652.072 and 653.072 will be respectively measured for payment by the EACH type of 72 inch fence post installed, complete in place.

BASIS OF PAYMENT

Item 645.172 will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

Items 652.072 and 653.072 will be paid for at the respective Contract unit price per EACH, which prices shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 657. TEMPORARY FENCE FOOT

The work under this Item shall conform to the relevant provisions of Subsections 644 and 665 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and installing of temporary fence for protecting pedestrians or as required by the Engineer.

Temporary fence for pedestrian protection shall be a minimum of 6 feet in height and shall be any type specified in Subsection 644 of the Standard Specifications. All end, corner and intermediate posts shall be driven into the ground and properly supported. The intent is to protect the safety of the general public.

The Contractor shall maintain temporary fence in good condition all the time. If damaged, shall be immediately repaired

The fence shall not be removed without prior approval of the Engineer.

Fence fabric shall be placed on the face of the post away from the work area. The top edge of the fabric shall be finished with a "knuckled" salvage.

During construction it will be necessary to remove and reset the temporary fence at difference locations to accommodate the stage construction.

Upon completion of the work, or as required by the Engineer, the fencing and supports shall be removed and disposed off site by the Contractor at no additional cost.

METHOD OF MEASUREMENT

Item 657. will be measured for payment by the FOOT of temporary fence, installed, maintained, and removed.

BASIS OF PAYMENT

Item 657. will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

No separate payment will be made for all posts including end, corner, and intermediate brace posts, all gates and gate posts of temporary fence for the convenience of the Contractor, the replacement and/or restoration of fence damaged due to construction accidents, vandalism and/or any other manner, and final removal, but all costs in connection therewith shall be included in the Contract unit price bids.

Payment of 80% of the Contract unit price for Item 657. will be made upon complete installation. The remaining 20% of the Contract unit price for Item 657. will be paid following complete removal.

ITEM 697.1 SILT SACK EACH

The work under this Item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this Item includes the furnishing, installation, maintenance and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing and proposed catch basins and drop inlets within the project limits and as required by the Resident Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions, and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and disposed of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the silt sack, the Contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractors expense. The silt and sediment from the silt sack shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

All curb openings shall be blocked to prevent stormwater from bypassing the device.

All debris accumulated in silt sacks shall be handled and disposed of as specified in Subsection 227 of the Standard Specifications

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsections 670, 751, and 767 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and installing approved geotextile filter fabric at the locations and in the manner shown on the plans or as required by the Engineer.

MATERIALS

The geotextile fabric shall conform to the requirements of Subsection M9.50.0, and be non woven.

CONSTRUCTION METHODS

The geotextiles shall be protected from exposure to sunlight during transport and storage. After placement, the geotextile shall not be left uncovered for more than two (2) weeks.

Traffic or construction equipment will not be permitted directly on the geotextile fabric. Geotextile fabric may be joined either by sewing or overlapping.

Sewn seams shall be lapped a minimum of four inches and double sewn. The thread used to sew the seam shall be nylon or polypropylene. Overlapped seams shall have a minimum overlap of 18 inches All seams shall be subject to the approval of the Engineer.

Geotextile that becomes torn or damaged shall be replaced or patched. The patch shall extend 3 feet beyond the perimeter of the tear or damage.

Bedding and Slope Protection:
The geotextile shall be placed and anchored on a prepared surface approved by the Engineer. The geotextile shall be laid loosely so that placement of the overlaying materials will not stretch or tear the geotextile. The backfill placement shall begin at the toe and proceed up the slope. Successive geotextile sheets shall be overlapped in such a manner that the upstream sheet is placed over the downstream sheet.

The surface upon which the geotextile is to be placed shall be within reasonable conformity to the proposed grade. The overlaying course shall be placed in one (1) lift and compacted as approved by the Engineer.

METHOD OF MEASUREMENT

Item 698.3 will be measured for payment by the SQUARE YARD of geotextile fabric for separation, complete in place, across the surface of grade and does not include overlapped portions.

BASIS OF PAYMENT

Item 698.3 will be paid for at the Contract unit price per SQUARE YARD, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

ITEM 701.3 STAMPED CEMENT CONCRETE TRUCK APRON SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsections 476, 701, and 901 of the Standard Specification and the following:

The work under this Item shall consist of the installation of an integrally colored and stamped concrete as indicated on the plans. This specialty pavement shall be constructed in accordance with these specifications and in conformity with the lines and grades shown on the plans and/or as required by the Town.

Stamped and colored concrete (mountable) shall be installed in the circular truck apron around the center island.

MATERIALS

The concrete shall have a minimum compressive strength of 4,000 psi. Portland Cement shall conform to ASTM C 150 Type I and II. All fine and coarse aggregates shall be nonreactive and shall conform to ASTM C 33. Air-entraining agent shall conform with ASTM C 250 and/or a normal set on retained set water reducing admixture conforming with ASTM C 494 may be used.

No admixture containing calcium chloride shall be used.

An integral coloring admixture meeting the requirements of ASTM C 979 shall be used to the total depth of the concrete in accordance with the manufacturer's recommendations.

Maximum aggregate size shall be ¾-inch.

All coloring, sealing, and sealant materials shall be from a single source manufacturer and shall be color coordinated.

Coloring Admixture: It shall be certified that the Colored Admixtures contain no calcium chloride, that their pigment components consist of pure mineral oxides only, that they comply with the requirements of Paragraph 7.6 Coloring Admixtures of ACI 212.1 R-81 (American Concrete Institute's Manual of Concrete Practice) as water-reducing admixtures, and that their water-reducing components have been tested for compliance with ASTM C 494 (Specification for Chemical Admixtures for Concrete), the normal-set, Colored Admixture being a Type A Admixture and the retarded-set. Colored Admixture, a Type D Admixture.

It shall also be certified that each admixture complies with Uniform Building Code Standard No. 26-12 as single Admixture for Cement Reduction, not as a combination of two or more additives or admixtures. Each shall be packaged such that one sack contains the proper dosage for one cubic yard of concrete. The pigment portion of the Colored Admixture shall comply with ASTM C 979.

ITEM 701.3 (Continued)

The stamped cement concrete color admixture shall be provided by:

1. L.M. Scofield Company;

2. Elite Crete Systems;

3. New England Hardscapes; or approved equivalent.

The admixture color for the truck aprons shall be a gray cobblestone running bond pattern or as otherwise approved. The amount of coloring admixture to be used shall be specified by the manufacturer for the particular color and type designated. The Contractor shall submit color sample of the truck apron for town approval prior ordering.

Color Hardener: Color hardener shall be a ready-to-use, dry-shake type hardener and shall be a streak-free intergrind of pigments, surface conditioning and dispersing agents, and Portland cement, blended with hard, graded aggregate. It shall not contain calcium chloride.

Color hardener shall meet ASTM C 979 for color stability.

Application rate shall be 120 pounds per 100 square feet or as recommended by the manufacturer.

Polyethylene Film shall be one (1) mil polystrip, clear or white opaque and shall conform to ASTM C 171.

Release Agent: Release agent shall be a powdered, colored, bond-breaker formulated to break the bond between mat-type concrete texturing tools and the surface of the color-hardened concrete while imprinting variegated or mottled appearance.

Release agent shall meet ASTM C 979 for color stability. Application rate shall be 4 pounds per 100 square feet. The release agent shall be applied in accordance with the manufacturer's recommendations.

Sealer: Sealer shall be clear, water-born, modified methylmethacrylate emulsion.

Expansion Joint: Preformed joint filler, bituminous type.

Joint Sealant: Joint Sealant shall be a high quality polyurethane based, having a 97 percent nonvolative content and a combined weight of 12.1 pounds per gallon. Sealant shall match color hardener.

Reinforcement (in mountable surface only): Shall be 6 x 6 x D6 welded wire fabric, plain.

Doweling (in mountable surface only): Dowels required for contraction and expansion joints as detailed on the plans shall be incidental to this item.

ITEM 701.3 (Continued)

SUBMITTALS

The Contractor shall submit samples to the Town for review and approval. Prior to commencing the placement of concrete, but after acceptance and approval of the preconstruction field sample, the Contractor shall submit properly labeled and identified samples of materials used in the approved samples as follows:

Coarse Aggregate	20 pounds
Fine Aggregate	20 pounds
Cement	20 pounds
Colored Admixtures	1 pint
Form Material-Contact Surface	1 square foot Polyurethane 4 square feet
Release Agent	1 pint
Joint Tape	2 linear feet
Surface Sealer	1 pint
Mix Design	1 certified copy

The samples shall be stored where directed by the Engineer and shall constitute material standards for the project. During construction, 1 pint of cement from each load of cement delivered to the ready-mix plant that will be used in this specific job will be retained and, after comparison with retained master sample, dated and stored with the other retained samples. Aggregate source must be checked periodically and compared with retained samples.

CONSTRUCTION METHODS

Experienced Personnel: The installation, coloring, finishing, patterning, and related activities are operations requiring a thorough knowledge of the properties of concrete, the characteristics of the coloring and patterning process, and experience with these methods and only skilled and experienced artisans shall be employed in this work item. Specifically the placement crews chief shall remain the same person from installation and approval of the sample(s) through the entire project.

The Contractor shall provide conclusive proof that he is qualified to and has previously produced such textured paving as specified and can comply with the provisions specified herein and shown on the plans. Proof shall consist of at least three high quality installations similar to that specified herein. Evidence that the Contractor is qualified shall be submitted within thirty days after the Notice to Proceed is received, and it shall be the responsibility of the prime bidder to ensure that that subcontractor he intends to use for this work be pre-qualified in accordance with this paragraph.

Field Sample: Thirty days prior to the placing of any colored and imprinted concrete paving, the Contractor shall make an onsite field sample, at a location approved by the Engineer, that is no less than 80 square feet (10-foot x 8-foot) in size, using the approved mix, texture, coloring materials in accordance with the instructions contained in these specifications. This sample shall not be part of the permanent pavement area. The field sample shall include 90 percent patterned area impressed from full patterns and 10 percent patterned area using hand tools and methods to match the full formed area.

ITEM 701.3 (Continued)

The sample shall be approved by the Engineer for color, texture, and pattern. Additional samples shall be required in the event that the first or subsequent samples are rejected.

Once the colored and stamped concrete sidewalk is complete and acceptable to the Engineer, the Contractor shall remove and dispose of the sample and restore the area to its prior condition to the acceptance of the Engineer, with all costs borne by the Contractor.

Forms: Set forms to required grades and lines, as shown on the plans, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

Imprinting Texturing Tools: Shall be mat-type tools of a high quality to produce a cobblestone running pattern for the truck aprons and a herringbone pattern for the median islands as produced by L.M. Scofield, Elitecrete Systems, New England Hardscapes or approved equal. The manufacturer of such tools shall have provided adequate training to the Contractor. The Contractor shall submit documentation that he has been trained by the tool manufacturer.

Concrete: Ready-mixed concrete shall be mixed and delivered. The same brand and type of cement shall be used throughout the project. Prior to the mix design being made, the cement intended for use shall be checked to determine that its lightness/darkness is similar to the cement used in the original approved sample. The Colored Admixture shall be added to the standard proportion specified by the manufacturer. No other admixtures (including calcium chloride) shall be used except an air-entraining agent complying with ASTM Designation C 260 when required by the Engineer.

Reinforcement: Locate, place and support as specified on the plans.

Concrete Placement: No concrete under this item shall be placed when weather conditions indicate precipitation can occur before completed surface patterning can be fully projected. Place only that amount of concrete, which can be completely finished and patterned in accordance with these specifications. Concrete which becomes too stiff for the proposed patterning shall be removed and disposed of by the Contractor and replaced in accordance with the plans, these specifications and/or as directed by the Engineer. Concrete removed, disposed of and replaced shall be at the Contractor's expense. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide uniform dampened condition at time concrete is placed.

Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand- spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing and joint devices.

The Contractor shall use a Portland Cement mortar slurry, compatible with the mix proportions to be used as a bonding agent at a location where fresh concrete is placed against hardened or partially hardened concrete surfaces.

Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than ½ hour, place a construction joint.

ITEM 701.3 (Continued)

Set reinforcement and place concrete in one lift for dowels at joints are in place to avoid using bonding agents.

Joints:
General – Construct expansion, weakened-plane (contraction), and construction joints true-to- line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the center line, unless otherwise indicated.

When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

Weakened-Plane (Contracting) Joints – Provide weakened-plane joints, sectioning concrete into areas as shown on the drawings. Construct weakened-plane joints for a depth equal to at least ¼ concrete thickness, as follows:

1. Tooled Joints – Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
   Or
2. Inserts – Use embedded strips of flexible PVC to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.

Construction Joints – Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than ½ hour except where such placements terminate at expansion joints. Construct joints as shown or, if not shown, use standard metal keyway section forms.

Expansion Joints – Expansion joints shall also be placed every 30 feet. Expansion joints shall also be placed around all appurtenances such as utility poles, hydrants, manholes, and other obstructions extending into and through the stamped concrete. Expansion joints installed around utilities shall be 3/8inch foam expansion joint polyethylene at a depth to match the stamped concrete.

Extend joint filler full-width and depth of joint and not less than ¼-inch or more than 1-foot below finished surface where joint sealer is indicated. If not joint sealer, place top of joint filler flush with finished concrete surface.

Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

Filler and Sealants – Install in accordance with manufacturer's recommendations.

ITEM 701.3 (Continued)

Primary Concrete Finishing: After strike-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

After floating, test surface for trueness with a 10-foot straightedge. Distribute concrete as required to remove the surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

Special Concrete Finishing: After completion of floating the entire surface finish as follows: Color Hardener shall be applied evenly to the plastic surface by the dry-shake method using a minimum of 60 pounds and a maximum of 70 pounds per 100 square feet. It shall be applied in two or more shakes, floated after each and troweled only after the final floating.

Fresh concrete shall be carefully and continuously monitored and tested during partial setting up so that proper consistency for patterning is achieved. Air temperature, humidity, wind conditions, and other factors affecting setting rate shall be considered in determining the start of patterning operations.

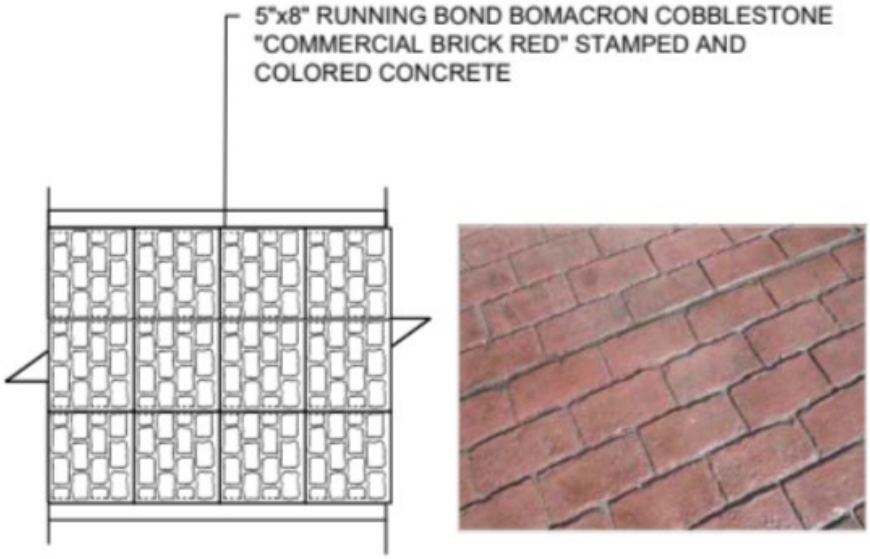
Release agent shall be applied evenly to surface.

While the concrete is still in the plastic stage of set, the imprinting tools shall be applied to create the impression to surface.

Full patterns shall be used to the maximum extent possible. Care shall be taken to ensure continuity of the pattern and to maintain proper relationships to direction of travel, edges, cut route, curbs, and other opportunities.

Pattern shall be 5”x8” Running Bond Bomacron Cobblestone “Commercial Brick Red” stamped and colored concrete or as directed by the Engineer.

ITEM 701.3 (Continued)



Where full patterns cannot be used, such as at corners, narrow areas, angles, ramps, or obstructions, hand detailing tools and methods shall be used to continue the intended pattern to the limit of the area. The hand methods shall match as closely as possible the pattern, color, and texture of the full pattern area.

Carefully lift and remove the polyethylene sheet.

Smooth and finish the patterned art concrete with a metal edging tool, having a 3-inch plate width and a ½-inch radius.

After the initial curing period, but in no case less than 72 hours, the surface of the concrete shall be sealed.

Repairs and Protections: Repair or replace broken or defective concrete as required.

Protect concrete from damage until acceptance of work. Maintain pavement free of stained and other damage until accepted by the Town.

Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

ITEM 701.3 (Continued)

METHOD OF MEASUREMENT

Item 701.3 will be measured for payment by the SQUARE YARD of stamped cement concrete truck apron installed, complete in place.

BASIS OF PAYMENT

Item 701.3 will be paid for at the Contract unit price per SQUARE YARD, which price shall include all labor, materials, equipment, dowels, reinforcement, wire fabric, joint sealant, backer rods, submittals, samples, mock up, and all incidental costs required to complete the work.

No separate payment will be made for reinforcement, expansion joints, load transfer assemblies and incidental materials to complete the work as specified herein and as shown on the Contract details.

ITEM 702.1 FLEXIBLE POROUS PAVEMENT FOR TREE PIT AREAS SQUARE FOOT

The work under this Item shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

The work under this Item consists of furnishing and installing a flexible porous pavement system around tree pits located within the sidewalk area, providing an accessible surface in accordance with ADA/AAB standards. The pavement shall be comprised of a resin-bound aggregate system (commonly known as "Flexi-Pave") or an approved equal, designed to promote water infiltration, root protection, and compliance with pedestrian accessibility requirements.

MATERIALS

The flexible pavement system shall consist of the following components:

- Aggregate: Washed granite, recycled glass, or other specified porous aggregate meeting ASTM C33 requirements for #8 or #89 stone.
- Binder: Polyurethane or modified polyurethane elastomeric binder, UV-stable, capable of maintaining flexibility across a temperature range of -20°F to 140°F.
- Thickness: Minimum of 2.0 inches compacted thickness unless otherwise noted on plans.
- Base: Minimum of 4.0 inches #2 washed crushed stone
- Color: Natural aggregate or colored as specified by the Engineer.
- ADA Compliance: The finished surface shall meet the requirements for slip resistance, surface firmness, and stability according to ADA standards.

All material shall be approved by the Engineer prior to installation.

SUBMITTALS

The Contractor shall submit the following for approval:

- Manufacturer's technical data sheets for aggregate and binder.
- Installation guidelines.
- Material Safety Data Sheets (MSDS) for all components.
- A 12" x 12" physical sample of the finished material.
- Certification that the product meets ADA surface performance criteria

ITEM 702.1 (Continued)

CONSTRUCTION METHODS
The work under this Item shall include the following:

Preparation:

- Excavate tree pit opening as indicated on the plans.
- Compact subgrade and install a minimum 4" thick layer of free-draining stone (ASTM No. 57) or specified base material.
- Install a geotextile separator fabric if required.

• Edge Forming:

- Install steel or recycled plastic edging around the perimeter of the tree opening to confine the flexible pavement.
- Provide a minimum 18" radius clearance around the tree trunk or as directed by the Engineer.

• Mixing and Placing:

- Thoroughly mix the aggregate and binder according to the manufacturer's recommendations.
- Place the mix evenly within the formed area, maintaining the specified thickness and finishing the surface flush with adjacent sidewalk surfaces.

• Curing:

- Allow curing time per the manufacturer's recommendation prior to allowing pedestrian traffic.

• Protection:

- Protect installed surfaces from traffic, vandalism, and inclement weather until fully cured.

METHOD OF MEASUREMENT

Item 702.1 will be measured for payment by the SQUARE FOOT of flexible porous pavement for tree pits areas installed, complete in place.

BASIS OF PAYMENT

Item 702.1 will be paid for at the Contract unit price per SQUARE FOOT, which prices shall include all submittals, labor, materials, equipment, excavation, backfill, base preparation, crushed stone finishing, curing, protection, and all incidental costs required to complete the work.

ITEM 702.2 HOT MIX ASPHALT BICYCLE CURB RAMP TON

The work under this Item shall conform to the relevant provisions of Subsection 702 of the Standard Specifications and the following.

The work under this Item shall consist of furnishing and constructing bicycle curb ramps at the locations as shown on the plans or as directed by the Engineer.

All work shall conform to the MassDOT Construction Standard Details dated May 2026 and latest Americans with Disabilities Act (ADA) and Architectural Access Board (AAB) regulations. The Contractor is hereby notified that they are ultimately responsible for constructing all project elements in strict compliance with the current AAB/ADA rules, regulations, and standards.

The AAB Rules and Regulations specify maximum slopes and minimum dimensions required for construction acceptance. There is no tolerance allowed for slopes greater than the maximum slope nor for dimension less than the minimum dimensions.

Hot mix asphalt bike curb ramp shall be 1 1/2 inches of surface course over 2 1/2 inches binder course in depth as shown on plans.

The Contractor is responsible for ensuring that all bicycle curb ramp are designed to conform to AAB/ADA and MassDOT Standard Construction Details and approved by the Engineer.

All bicycle curb ramp joints and transition sections which define grade changes shall be formed, staked and checked prior to placing cement concrete. All grade changes are to be made at joints. The Contractor is responsible for ensuring that all pedestrian curb ramps are designed to conform to AAB/ADA and are approved by the Town. All wheel chair ramps shall have detectable warning panels permanently embedded into the concrete at the bottom of the ramp.

Directional Bar tile for bike ramp shall conform with the details shown on the plans and as directed by the Engineer. The tiles shall be conformed to Americans with Disabilities Act (ADA) requirements and color shall be red. The Contractor shall provide a sample of the panels to the Engineer for approval prior ordering.

METHOD OF MEASUREMENT

Item 702.2 will be measured for payment by the TON of hot mix asphalt bicycle curb ramp installed, complete in place.

BASIS OF PAYMENT

Item 702.2 will be paid for at the Contract unit price per TON, which price shall include all materials, labor, equipment, and all incidental costs required to complete the work. Directional bar tile shall be considered incidental to the Item and no separate payment shall be made.

ITEM 706. BRICK WALK SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and installing a new brick walk on a bituminous setting bed. Where the new brick walk is to meet an existing brick walk, the new bricks shall match existing brick size, texture, and color to the extent practicable. The Contractor shall submit proposed brick samples to the Engineer for approval.

The Contractor shall exercise extreme care in the removal, storage and relaying of the bricks to avoid breakage. Bricks damaged or determined by the Engineer as unsuitable for resetting, shall be replaced at the Contractor's expense.

Stone dust leveling bed shall be 1.5 inches in depth and meet the following sieve analysis:

Sieve	Percent Finer Than
No. 4	100
No. 8	96
No. 28	61
No. 48	49
No. 100	38
No. 200	23

The stone dust shall be set on the bituminous setting bed using an adhesive of neoprene modified asphalt. Typical proprietary materials contain 75 percent solids in a mineral spirit solvent. The solids consist of 2 percent neoprene, 10 percent asbestos free fibers and 88 percent asphalt. The adhesive should have a density of 8.0 to 8.5 lb per gal. The adhesive is typically supplied in pails or drums. The material should be stored in accordance with the manufacturer's recommendations and be thoroughly mixed before application.

Fine grading and compacting the stone dust leveling bed for constructing the brick walk is included under this Item.

METHOD OF MEASUREMENT

Item 706. will be measured for payment by the SQUARE YARD of brick walk installed, complete in place.

BASIS OF PAYMENT

Item 706. will be paid for at the Contract unit price per SQUARE YARD, which price shall include all labor, materials, equipment, fine grading and compacting, bricks, polymeric joint sand, stone dust leveling bed, bituminous setting bed, tack coat, geotextile filter fabric, brick samples, and all incidental costs required to complete the work.

ITEM 706.7	**SEASHELL WALKWAY OR DRIVEWAY REMOVED AND RESET**	**SQUARE YARD**
ITEM 706.8	**MISCELLANEOUS SURFACE WALKWAY OR DRIVEWAY REMOVED AND RESET**	**SQUARE YARD**

The work under these Items shall conform to the relevant provisions of Subsection 701 of the standard Specifications and the following:

Granite pavers, bricks, flagstone pavers, cobblestones, slate pavers, shell walkway and driveway, and other types of pavers or walk surface materials not classified and paid for under other items are to be removed and reset and construct new shell surface walkway and driveway where not existing as shown on the plans and as directed by the Engineer.

Existing bricks or granite pavers set in mortar shall be removed from the mortar by hand. All mortar is to be removed from each paver by sandblasting and the paver stockpiled. The subgrade area of the paver shall be adjusted adequately to achieve the proposed grade and compacted gravel borrow installed 8 inches deep. The stockpiled pavers shall be set in a 4-inch-deep mortar bed set on the compacted gravel subgrade.

Existing flagstone, bricks, pavers, shells, cobblestone or other walkway or driveway surface material not set in mortar shall be removed and stockpiled by hand. The subgrade area of the walkway or driveway to be reset shall be adjusted adequately to achieve the proposed grade with masonry sand (minimum depth of 4 inches), compacted gravel, or existing subbase material as directed by the Town. The masonry sand shall be tampered where the pavers, shells, cobblestone, or other walkway or driveway surface material are to be placed. The pattern of the reset material shall match the existing walkway or driveway. New shell surface walkway or driveway shall be at a minimum of three (3) inches of shell surface material or as directed by the Engineer.

Existing flagstone, bricks, pavers, cobblestone, other driveway surface material, and granite steps broken or chipped shall be replaced in kind by the Contractor at his own expense. Any new material required for extensions of existing driveway or walkway surfaces shall match in kind or as directed by the Engineer and will be paid under item 706.8. In the case where shell surface walkway or driveway does not exist and a new shell walkway or driveway to be constructed, the cost for constructing the new walkway or shell driveway will be paid under item 706.7.

METHOD OF MEASUREMENT

Item 706.7 will be measured for payment by the SQUARE YARD of seashell walkway or driveway removed and reset installed, complete in place.

Item 706.8 will be measured for payment by the SQUARE YARD of miscellaneous surface walkway or driveway removed and reset , complete in place.

ITEM 706.7 and ITEM 706.8 (Continued)

BASIS OF PAYMENT

Item 706.7 and Item 706.8 will be paid for at the respective Contract unit price per SQUARE YARD, which prices shall include all labor, materials, equipment, tools, removal and stockpiling of existing driveway or walkway surfaces, furnishing and compacting subbase material, gravel borrow, sand, grading, stone dust, hot mix asphalt base, including the replacement of individual driveway surface material in poor condition with in kind material, masonry sand, mortar and mortar bed, and any new in kind material required for extensions of existing driveway or walkway surfaces to match the existing surface material, and all incidental costs required to complete the work.

ITEM 707.15 PARK BENCH REMOVED AND RESET EACH
ITEM 707.16 BIKE RACK REMOVED AND RESET EACH

The work under these Items shall conform to the relevant provisions of Subsections 701 and 901 of the Standard Specifications and the following.

The work under these Items shall include the removal and resetting of existing surface mounted features (bench and bike rack) within the project limits as shown on the plans and as required by the Engineer.

INSTALLATION

The Contractor shall carefully remove the existing features and shall store the features until resetting. If required by the Engineer, the Contractor shall mount features at a temporary location until final location has been constructed.

The Contractor shall furnish and install new mounting hardware equivalent to existing hardware. Hardware shall be corrosion resistant.

The Contractor shall use concrete anchor bolt system for surface mount fastening of relocated features. The method for installation shall be either drilled and mechanical expansion type system or drill and adhesive epoxy type system. The Contractor shall follow the fastener manufacturer recommendations. A minimum 5/8" anchor bolt shall be used.

The Contractor shall protect features from paint spatter, concrete splashes and other construction damage by wrapping in plastic sheeting or heavy kraft paper and taping in place. The protective wrap shall not be removed until adjacent work is completed.

The Contractor shall repair any damage or provide replacement if features are damaged as a result of construction operations.

PROTECTION

Protect all stored and installed park bench and bike rack from damage, use, theft or vandalism until acceptance. Contractor shall adjust, repair, or replace damaged, missing, or unacceptable items at their own expense. Site items shall be clean and finishes as specified as condition of acceptance. Clean with non-abrasive means, careful not to damage finishes.

METHOD OF MEASUREMENT

Item 707.15 and Item 707.16 will be respectively measured for payment by the EACH park bench or bike rack removed and reset.

BASIS OF PAYMENT

Item 707.15 and Item 707.16 will be paid for at the respective Contract unit price per EACH, which prices shall include all labor, materials and equipment, removal, dismantling, loading, transporting, storage, and resetting of the park benches and bike rack, concrete foundation, excavation, backfill, and all other incidental costs required to complete the work. Any hardware required to complete the work as specified herein or as shown on the Drawings shall be considered incidental to the work of these Items, and no separate measurement or payment will be made.

ITEM 740. ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

Work under this Item shall conform to the relevant provisions of Subsection 740 and the following:

Three computer systems and a printer system meeting minimum requirements set forth below including installation, maintenance, power, paper, disks, and other supplies shall be provided at the Resident Engineer's Office:

All equipment shall be UL approved and Energy Star compliant.

The Computer System shall meet the following minimum criteria or better:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio	the computer system shall be capable of allow video calling and recording:
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the Contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

ITEM 740. (Continued)

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11” x 17” paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

Compensation for this work will be made at the contract unit price per month which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as directed by the Engineer.

ITEM 751.7 COMPOST BLANKET CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsections 751 and M1.06.0 Compost of the Standard Specifications and the following:

Work shall consist of furnishing and pneumatically applying compost as a thin mulch blanket (1/2-1 inch depth) over prepared soil to provide temporary soil stabilization and organic matter for plant growth.

SUBMITTALS AND MATERIALS

No materials shall be delivered until the required submittals have been approved by the Engineer. Delivered materials shall match the approved samples. Approval of test results does not constitute final acceptance.

Contractor shall submit to the Engineer samples and certified test results no sooner than 60 days prior to application of compost. Vender certification that material delivered meets the test results shall be submitted if requested.

Compost shall meet the requirements for M1.06.0: Compost, Type 2, as referenced in the MassDOT– Highway Division Standard Specifications for Highways and Bridges, Division III: Materials Specifications, latest edition.

The Engineer shall approve the Contractor's equipment for application.

CONSTRUCTION METHODS

Application of compost material shall not begin until the Engineer has approved the site and soil conditions. Soil preparation shall be as specified under the applicable item for soil placement or for seeding. The Contractor shall notify the Engineer when areas are ready for inspection and application of compost.

Compost blanket shall be pneumatically applied (blown on) to a minimum depth of one half to one inch. Where shown on the plans or when directed by the Engineer depth may be increased to provide berms for sediment control or to otherwise prevent slope erosion.

When compost blanket is proposed with seeding, seed shall be broadcast and shall occur in conjunction with compost blanket, as specified under the relevant item for seeding.

When compost blanket is proposed for areas with planting, compost (and seed if applicable) shall be applied after planting. If compost and seed occur prior to planting, areas shall be regraded and compost and seed reapplied to the satisfaction of the Engineer and at the Contractor’s expense.

ITEM 751.7 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 751.7 will be measured and paid for at the Contract unit price per Cubic Yard which price shall include all labor, materials, equipment, and all incidental costs required to complete the work of pneumatically applying compost.

Surface preparation of substrate receiving compost blanket shall be compensated under the applicable item for placement of loam, sand, ordinary borrow, wetland soil, topsoil rehandled and spread, tilled existing soil, or other specified substrate.

Seeding, if utilized, will be compensated for under the appropriate seeding items.

ITEM 754.23 EASTERN BOX TURTLE (TERRAPENE CAROLINA) PROTECTION PLAN LUMP SUM

This section outlines the requirements of the Division of Fisheries and Wildlife's Natural Heritage and Endangered Species Program (MassWildlife) for projects that occur in the vicinity of high-priority Eastern Box Turtle (Terrapene Carolina) populations. The work to be done consists of the development and implementation of an Eastern Box Turtle Protection Plan, in accordance with the letter by the Massachusetts Division of Fisheries & Wildlife Natural Heritage & Endangered Species Program (MassWildlife) regarding the Shank Painter Road Corridor Improvements from Route 6 to Bradford Street in Provincetown, Massachusetts (dated June 27, 2025). Compliance with MassWildlife's letter is the responsibility of the Contractor (see Document A00870 included herein).

Eastern Box Turtle (Terrapene Carolina) Protection Program

If any work occurs within Eastern Box Turtle habitat, an Eastern Box Turtle Protection Plan is required. The Contractor shall submit the qualifications of a Turtle Biologist (Biologist) to the Resident Engineer and the MassDOT Wildlife and Endangered Species Unit (WESU) (David Paulson, WESU Supervisor, David.J.Paulson@dot.state.ma.us) for review and approval and then to MassWildlife (Tim McGuire, Endangered Species Review Biologist, MassWildlife Natural Heritage & Endangered Species Program, 1 Rabbit Hill Road, Westborough, MA 01581; Timothy.McGuire2@mass.gov; 508-389-6366) for review and approval. This is required prior to the development of the Eastern Box Turtle Protection Plan.

Prior to any work, the Contractor shall submit an Eastern Box Turtle Protection Plan, prepared by the Biologist, to the Resident Engineer and WESU (David Paulson, WESU Supervisor, David.J.Paulson@dot.state.ma.us) for review and approval. Said Protection Plan must then be submitted to MassWildlife (Tim McGuire, Endangered Species Review Biologist, MassWildlife Natural Heritage & Endangered Species Program, 1 Rabbit Hill Road, Westborough, MA 01581; Timothy.McGuire2@mass.gov; 508-389-6366) and approved in writing prior to the start of work.

At a minimum, the Eastern Box Turtle Plan shall include:

- Scientific Collection Permit application. The Scientific Collection Permit must be obtained from MassWildlife to handle state-listed species.
- Biologist name, contact information, and qualifications.
- Anticipated schedule of operations within Eastern Box Turtle Habitat.
- Description of any proposed methods to be established at the limit of work barrier to isolate Eastern Box Turtle from the work zone, and to keep construction personnel outside of unpermitted sensitive areas.
    - May include the use of silt fence and/or other types of barriers, and signage.
- Description of turtle monitoring protocols to ensure Eastern Box Turtle individuals are not harmed by work activities.
- Construction personnel training/education on the Eastern Box Turtle.

ITEM 754.23 (Continued)

MassWildlife staff is available for further guidance and consultation on the development of the Eastern Box Turtle Protection Plan (Tim McGuire, Endangered Species Review Biologist, MassWildlife Natural Heritage & Endangered Species Program, 1 Rabbit Hill Road, Westborough, MA 01581; Timothy.McGuire2@mass.gov; 508-389-6366).

BASIS OF PAYMENT

Item 754.23 will be paid for at the Contract price per LUMP SUM, which price shall include the cost of the Biologist, coordination with MassWildlife, training, inspections, reports, protective fencing, including installation and maintenance the Eastern Box Turtle Protection Plan, and all incidental costs required to complete the work.

Upon approval of the Biologist by the Resident Engineer and MassWildlife, a payment of 30% of the Lump Sum shall be paid. The remaining 70% shall be paid in 10% increments distributed equally throughout the remaining period of the Contract.

ITEM 755.45 WETLAND RESTORATION SQUARE YARD

DESCRIPTION

The work under this item shall conform to the relevant provisions of Subsections 120, 751, 765, 767, and 771 of the Standard Specifications and the following:

The work under this item shall include all labor and furnishing of materials to complete the work specified herein to protect and restore existing inland wetland areas that will be temporarily impacted as shown on the drawings and as required by the Engineer.

Inland Wetland Replication work shall be as specified and compensated under that item. Tidal wetland mitigation shall be as specified under the appropriate item for tidal wetlands.

Restoration Area shall be constructed to meet the requirements of all associated permits and certifications, including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40), Section 401 Water Quality Certification, and Section 404, U.S. Army Corps of Engineers General Permit.

Construction of the Replication Area shall be completed as shown on the plans at the following location:

Area A at Station 500+52 to 500+68 at Route 6 East baseline Area = 76 S.F.

All work shall be in coordination with an approved Wetland Specialist. Wetland Specialist qualifications and requirements shall be per Item 755.75, Wetland Specialist.

SUBMITTALS – DOCUMENTS

Request for Conditional Acceptance: As specified below, a letter requesting Conditional Acceptance of the work and the site conditions shall be submitted to the Engineer.

Request for Final Acceptance: As specified below, a letter requesting Final Acceptance of the work and the site conditions shall be submitted to the Engineer.

Request for Certificate of Compliance (Partial or Full): If applicable, request for a Certificate of Compliance shall be submitted to the Engineer for distribution to appropriate regulatory agencies as specified below.

Monitoring Reports: Reports shall be submitted to the Engineer as specified below. Reports shall be compensated under Item 755.76 Wetland Monitoring Reports.

ASSOCIATED ITEMS AND MATERIALS

Geotextile Fabric for Temporary Soil Protection shall be as specified under that item.

Timber Mat shall be as specified under that item.

ITEM 755.45 (Continued)

Compost shall be in accordance with Subsection 751 and M1.06.0 Organic Soil Additives of the Standard Specifications. Compost shall not contain seeds, roots, stems, or other viable parts of invasive plants or other noxious plants. Off-site sources shall be identified and available for inspection prior to transport of material to the site to verify that they are likely to be free of invasive plant species, including all viable plant parts.

Compost Blanket shall be as specified under that item.

Seed Mix *shall be Pure Live Seed and shall be wetland mix comprised of native New England species from one of the following suppliers or an approved equal: New England Wetland Plants, Amherst, MA (#413) 549-4000; Allen Seed, Exeter, RI (#800-527-3898); or Ernst Conservation Seeds, Meadville PA (#800- 873-3321). Such mix shall be specific to the hydrologic conditions of the site and approved by the Wetland Specialist or MassHighway Landscape Design Section.*

Required submittals include:

- Certificate of Materials from the supplier shall be submitted and approved 30 days prior to ordering seed. Seed species listed on the certificate shall include ecotype region (i.e., *Asclepias incarnata*, PA Ecotype).

- Seed tag from the bag of seed used shall be submitted to the Engineer at the time of seeding. Seed tag shall include ecotype region and species, guaranteed percentages of purity, weed content and germination of the seed, and the net weight. Seed tag shall match the Certificate of Materials, include the name of the supplier, and date material was sent.

- Bill of lading or a notarized Certificate of Compliance from the Supplier serving as proof of purchase shall be submitted if requested by the Engineer. Document shall include date of sale, quantity, lot number, and address of Supplier. This shall match the seed tag. Notary shall not work for either the contractor or seed supplier.

Fertilizers shall not be used.

Straw mulch or hydromulch shall be per Section M6 of the Standard Specifications.

Water

The Contractor shall provide water and all equipment required at no extra cost. Water shall be suitable for irrigation and free from ingredients harmful to plants and wildlife. Water from the adjacent water bodies or waterways shall not be utilized. It is the Contractor's responsibility to correct injury or damage due to the lack of water, too much water, or use of contaminated water.

ITEM 755.45 (Continued)

CONSTRUCTION METHODS & SEQUENCE

Site Protection Prior to Impacts

Prior to any land work, as part of the initial site-walk, the Wetland Specialist shall photo-document the site and provide a summary report of existing conditions as outlined under Item 755.75 Wetland Specialist.

Where and as required vegetation shall be cut flush and area surveyed to establish pre-construction elevations.

Following the cutting and surveying, temporary separation fabric or timber matting shall be placed as required to protect soil and vegetation from compaction, contamination, and/or other damages. Fabric and timber mats shall be placed as specified under the respective items and the Engineer shall approval placement.

Restoration Upon Completion of Roadway Construction Work

Sediment Barriers

If required for sediment control during Restoration work (i.e, tilling is required to restore soil), sediment barriers shall be installed along the downslope perimeter of the Restoration Area beginning and ending in the surrounding upland so that no disturbed soil can enter adjacent wetlands or waters. Sediment barriers shall be in place and approved by the Engineer prior to any soil disturbance. No work shall take place outside the barriers.

Removal of Fill and Grading
Fill and temporary separation fabric or mats shall be removed and disposed of as specified under the respective items.

If required, grades shall be restored to pre-construction elevations as shown in the baseline survey or as required by the Engineer and Wetland Specialist to restore hydrologic functions. Final elevations shall be approved by the Engineer prior to soil preparation and seeding. Grading shall be incidental to this item.

Following approval of grading to elevations required, soil shall be prepared and seeded as follows.

Soil Scarification
Compacted soil shall be scarified with equipment approved by the Engineer. Upon approval of soil scarification, the area *shall* be seeded with Compost Blanket *as* ***specified below. Seeding shall immediately follow soil preparation.***

ITEM 755.45 (Continued)

Seeding with Compost Blanket

Application of compost blanket and seed shall be done as one application and shall not begin until the Engineer has approved the site and soil conditions. The Contractor shall notify the Engineer when raked areas are ready for inspection and application of compost blanket and seed.

Compost shall be pneumatically applied (blown on) to a depth of one half to one inch at the same time that seed is broadcast such that seed is covered by a light application of compost.

When planting occurs on projects with compost blankets and seed application, planting shall occur prior to application of compost and seed. Otherwise, compost and seed shall be re-applied to the satisfaction of the Engineer and at not cost to the contract.

Seed tags shall be submitted at time of seeding.

SEED ESTABLISHMENT

Seeding that fails to establish according to the conditions of acceptance below shall be over-seeded as required by the Engineer. Washouts and channels shall be repaired and stabilized prior to overseeding. Excessive weed growth shall be pulled out by the roots or, with approval from the Engineer, cut prior to over-seeding. Soil repair and weed control are incidental to this item.

CONDITIONAL ACCEPTANCE OF WORK

Conditional Acceptance shall indicate approval of the wetland restoration work and agreement that work has been done according to plan or modified as approved.

Upon completion of construction, the Contractor shall submit a Request for Conditional Acceptance that includes a brief narrative from the Wetland Specialist (if applicable to project) demonstrating that the wetland restoration work was done according to plans (or how modified) and meets required permit conditions (if applicable). The narrative shall include, photo-documentation of pre-construction conditions as well as soil work, planting, and seeding. Seed tags shall be submitted as part of the Request for Conditional Acceptance.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist, and regulatory representative (if required) shall assess the Restoration Area and the surrounding areas. At a minimum, the following conditions shall be included in the narrative and reviewed as part of the on-site assessment of whether:

- The target elevations have been restored per the survey or adjusted per the Engineer. Areas that are too high or too low should be identified along with suggested corrective measures.
- Soil compaction has been mitigated.
- Soils are stabilized and there is no sediment in the wetland and no channeling of slopes.
- Hydrology meets performance standards and has been adequately restored.
- Specified seed mix has been seeded and seeded species in the wetland and adjacent upland show signs of good germination and healthy growth.

ITEM 755.45 (Continued)

- Planted woody and herbaceous species (if included) meet specifications and are establishing well.
- There are no invasive plants visible in the restored wetland area.
- Silt fence and non-biodegradable sediment barrier materials have been removed.

Upon approval that the work meets the above conditions, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Restoration work is not approved, MassDOT will issue a rejection letter requiring corrective actions. Work not approved shall be addressed by the Contractor at no extra cost.

Erosion of adjacent slopes or the flow of sediments into the wetland between Conditional and Final Acceptance shall be immediately addressed by the Contractor.

FINAL ACCEPTANCE OF WORK

Following one full growing season, the Contractor shall submit a Request for Final Acceptance. Submittal shall include a brief narrative of conditions. Upon receiving the Request, the Engineer, Wetland Specialist and regulatory representative (if required) shall assess the Restoration Area. Final Acceptance will initiate the start of the Monitoring Period (if required).

The following conditions shall be inspected and approved for acceptance and payment:

- Hydrology is functioning as intended.
- The desired seeded species are establishing well and cover 100 percent of the restoration area, excluding areas of open water, large boulders or planned bare soil.
- No sediments have entered the wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- Planted woody and herbaceous species (if included) meet specifications and are establishing well.
- There are no visible invasive plants.

If the restoration work is not approved, MassDOT will issue a rejection letter requiring corrective action. All costs associated with corrective measures and plant replacement shall be incidental to this item with no additional compensation. Work not approved shall be addressed by the Contractor at no extra cost.

MONITORING REPORTS FOR REGULATORY COMPLIANCE

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist as specified and compensated under Item 755.76 Wetland Monitoring Reports.

Generally, the following conditions shall be met upon each inspection:

- Hydrology is functioning as intended, relative to the preexisting condition of the restored wetland.
- Seeded species are establishing well and cover 100 percent of the area, excluding areas of open water areas or planned bare soil.
- No sediments have entered into wetland.

ITEM 755.45 (Continued)

- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.

If, at the end of the required monitoring period, the requirements have not been met and success of the wetland replication area has not been achieved as determined by the Monitoring Reports, the Contractor shall provide corrective measures. All costs associated with corrective measures and plant replacement shall be incidental to this item with no additional compensation.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 755.45 will be paid for at the Contract unit price per Square Yard, which price shall include all labor, materials, compost and amendments, seed, mulch, equipment, submittals, maintenance, grading, and incidental costs necessary to complete the work as required.

Payment shall be as follows:

- 50% upon completion of soil preparation and seeding
- 25% upon Conditional Acceptance
- 25% upon Final Acceptance or approval of the Engineer

Sediment Control Barrier will be paid under Item 767.121
Compost Blanket will be paid under Item 751.7
Wetland Specialist will be paid under Item 755.75
Wetland Monitoring Reports for follow-up monitoring will be paid under Item 755.76

ITEM 755.75 WETLAND SPECIALIST HOUR

Work under this Item shall be for services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications hereafter referred to as the "Wetland Specialist."

"Wetland Mitigation" shall be used herein for applicable wetland work. For this project, applicable wetland work is for: ***755.45 Wetland Restoration (restoration after temporary impacts).***

The Wetland Specialist shall demonstrate knowledge and expertise to coordinate and oversee all work associated with the Wetland Mitigation as defined herein, as shown on the Plans, as required by permits, and as specified under the relevant Wetland Mitigation items.

Regulatory monitoring reports following Final Acceptance of the Wetland Mitigation shall be per Item 755.76, Wetland Monitoring Reports.

For all onsite work, the Wetland Specialist shall sign in and sign out with the Engineer.

The Wetland Specialist shall not be from the same company as the company responsible for planting, seeding, and/or maintaining the wetland.

QUALIFICATIONS

The Wetland Specialist shall have a minimum of five (5) years of experience with construction and monitoring of wetland mitigation areas similar in size, type, and complexity to the Contract mitigation. When required by permits, at least ten (10) years of experience may be required. The Wetland Specialist shall be thoroughly versed in the Commonwealth of Massachusetts Wetlands Protection Act (MGL C.131, s.40), U.S. Army Corps of Engineers New England District Compensatory Mitigation Guidance, and all other relevant regulations of the Massachusetts Department of Environmental Protection and the U.S. Army Corps of Engineers New England District.

SUBMITTALS - QUALIFICATION

Within sixty (60) days following the Notice to Proceed, the Contractor shall provide proof of qualifications for the Wetland Specialist to the Engineer for approval. Submittals shall include, but not be limited to, the following:

- Resume of the individual on-site implementing the Wetland Specialist work. If the Wetland Specialist changes over the course of the project, the new individual shall submit resume and qualifications for approval 30 days prior to doing any work on-site.
- Resume of any personnel working on-site in place of the Wetland Specialist. Individual shall be approved prior to work on-site.
- Narrative describing the company, its expertise, technical qualifications and experience with wetland construction.
- At least three (3) references from prior work of a similar nature completed in the last five (5) years and by the individuals who will perform the work. Provide contact information for each reference including address, phone number and email.

ITEM 755.75 (Continued)

- A summary of each reference project including nature of the work, project size, dates, and period of construction and monitoring, methodologies used, and summary of success (or not) in terms of meeting performance objectives. Summary shall include a minimum of one before and one after photo for each project.

SUBMITTALS – DOCUMENTATION AND REPORTS

Wetland Construction Oversight

Wetland Specialist shall provide documentation of pre-existing conditions and wetland construction as specified below and as part of fulfilling the Scope of Work described below. Documentation shall include photos that are clear and legible. Photos are incidental to this item.

- ***Site Walk Prior to Disturbance and Construction of Wetlands:*** Provide brief assessment with photos, including documentation of the existing wetlands to be impacted (both permanent and temporary), proposed wetland replication area, and reference/model wetland areas (typically an adjacent undisturbed wetland or the existing wetland to be impacted). Photos of existing wetlands that will be temporarily impacted shall include a view from at least 3 angles.
- ***Excavation and Grading:*** Documentation shall include minimum of two photos of the excavated wetland and two photos after final grading prior to planting and seeding. For restoration areas, photos shall show soil preparation (i.e, tilling and grading), if applicable.
- ***Approval of Subgrades****:* The Wetland Specialist shall inspect the sub-grade of the Replication Area to ensure that proper hydrology is likely to be established and shall provide the Engineer with written confirmation and photographs upon completion of subgrade excavation work. Written confirmation shall include recommended field adjustments, based on field observations, to achieve the desired hydrology and designed wetland system.
- ***Planting and Seeding:*** Provide assessment and photos of vegetation upon completion of planting and seeding work.

Wetland construction documentation and reports shall be submitted with Request for Conditional Acceptance and for the Order of Conditions, Water Quality Certifications, and other regulatory permits as required.

Requests for Acceptance of Work & Regulatory Compliance

The Wetland Specialist shall submit the following documents if and as specified herein and under Item the relevant Wetland Mitigation items:

- Request for Conditional Acceptance.
- Request for Certificate of Compliance (Partial or Full) when applicable.
- Request for Final Acceptance.

ITEM 755.75 (Continued)

SCOPE OF WORK

In the event of discrepancies with the applicable permits, the Wetland Specialist shall submit a Request for Information (RFI) to the Engineer.

General

The Wetland Specialist shall be responsible for the following:

- Review and have a comprehensive knowledge of the environmental permits relevant to the specific mitigation work being done so as to ensure compliance throughout the duration of the contract.
- Identify and inform the Contractor and Engineer of unique site conditions which may require adjustments to the schedule, design, or construction methods. For example, wildlife nesting, illegal dumping, or rare species.
- Identify and inform the Contractor and Engineer of any sediment or erosion control problems observed within mitigation areas.
- Advise so as to avoid impacts to adjacent areas and regulated wetland resources.
- Participate in necessary meetings as required by permits and when requested by the Engineer.

Inspections & Construction Oversight

The Wetland Specialist shall be responsible for, but not limited to, the following:

- Pre-Construction Site Walk
    - Following surveying, flagging, and staking of all relevant boundaries and elevations by the Contractor, the Wetland Specialist shall walk the site with the Engineer and the Contractor to review existing and proposed conditions, recommend changes if necessary, and approve the following: location and boundaries of the Mitigation Area, target elevations and grades, location of tree protection associated with the Mitigation Area, and final layout and limits of clearing for access route.
    - Select and mark snags, logs, and woody material to be retained for placement in the Wetland Mitigation, as appropriate.
    - Note invasive plants in and adjacent to Wetland Mitigation.
    - Provide summary report if and as specified under Wetland Mitigation items.
- Excavation, Soil Placement, Grading for Replication Areas
    - Approve excavated depth and grading for appropriate wetland hydrology, subsoil preparation, and finished grade of placed wetland soil.
    - Adjust grades as required and approve microtopography. If grades need to be adjusted, submit an RFI to the Engineer.
    - If requested by the Engineer, the Wetland Specialist shall inspect stockpiled wetland soil for moisture content and signs of undesirable weeds.
- Soil Protection and Restoration Measures for Restoration Areas
    - Review and approve methods of soil protection and restoration if required.

ITEM 755.75 (Continued)

- Confirm decompaction will adequately restore appropriate wetland hydrology. If decompaction measures need to be adjusted, submit an RFI to the Engineer.

- Re-vegetation of Mitigation Area
  - Placement of woody material to be re-used.
  - Verify seed used complies with specifications and site conditions, determine limits for wetland seeding based on elevations, approve seeding and mulching methods, and collect seed tags to submit with Request for Conditional Acceptance.
  - Review planting methods (if applicable) prior to installation and oversee layout of wetland plants.

Conditional Acceptance

Upon completion of construction of the wetland, as part of the Request for Conditional Acceptance, the Wetland Specialist shall provide a brief narrative demonstrating that the wetland construction work was done according to plans (or how modified) and meets the conditions required for acceptance as specified under the Wetland Mitigation items. Submittal shall include a report and photo documention of pre-construction conditions, construction work, seeding, planting, and other work as specified under the Wetland Mitigation items. Photos of completed Wetland Restoration areas shall include the same views as the pre-construction reference photos.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under the Wetland Mitigation items.

Upon approval, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Mitigation work is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

Request for Certificate of Compliance

If required, a Request for Certificate of Compliance shall be prepared and submitted to the Engineer immediately following Conditional Acceptance. Request shall be as specified under the relevant Wetland Mitigation items.

Request for Final Acceptance

Following one full growing season, the Wetland Specialist shall provide a brief narrative of the status of the Wetland Mitigation to be submitted with the Request for Final Acceptance.

Upon receipt of the Request, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under the relevant Wetland Mitigation items.

ITEM 755.75 (Continued)

If the Wetland Mitigation is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

METHOD OF MEASUREMENT

Item 755.75 Wetland Specialist shall be measured per hour for on-site service provided by the Wetland Specialist.

Work shall include all inspections, photos, submittals, and associated tasks for construction and restoration oversight, narratives for Conditional and Final Acceptance, Request for Certificate of Compliance (Partial or Full) if required, documentation required for permits, and all other work specified above. Payment shall not include travel time or time spent off-site on reports. Decimal Pay Limits will be 0.25 hours.

BASIS OF PAYMENT

Item 755.75 Wetland Specialist shall be paid at the Contractor bid price for each hour, or fraction thereof, spent on-site to perform the work as described above. Reports and photo documentation are required for payment.

Post wetland construction reports shall be per Item 755.76, Wetland Monitoring Reports.

ITEM 755.76 WETLANDS MONITORING REPORTS LUMP SUM

Work under this Item shall consist of the submittal of Wetland Monitoring Reports following the completion of wetland construction and shall include all inspections, photos, and other work required to complete those reports as specified herein.

"Wetland Mitigation" shall be used herein for applicable wetland work, whether Wetland Replication (creation of a new wetland) and/or Wetland Restoration (restoration after temporary impacts).

The Contractor shall retain the services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications, hereafter referred to as the "Wetland Specialist," to complete the Wetland Monitoring reports. Wetland Specialist shall meet requirements specified under Item 755.75 Wetland Specialist.

All on-site Wetland Specialist services required to complete the construction and revegetation of the wetland replication, including preparation and submission of monitoring reports during construction, shall be per Item 755.75 Wetland Specialist.

SCOPE OF WORK

Post-Construction Wetland Monitoring Reports

Final Acceptance of the wetland construction work as specified under Item 755.45 shall initiate the beginning of the Monitoring Period.

Inspections and reports shall be performed to ensure compliance with mitigation requirements defined under the relevant Wetland Mitigation items and with all applicable environmental permits. Monitoring reports shall cover the following:

- Identification of all plant species present
- Percent cover for each plant species and overall percent surface area cover by indigenous wetland plant species for replication area and upland
- Description of the viability, health, and vigor of installed plants as well as volunteer plant species within the replication areas
- Description of remedial measures taken to ensure criteria are met
- Depth to apparent water table and/or depth of surface inundation, both as measured from the soil surface and data loggers, as appropriate.
- A conclusion regarding the success of the wetland mitigation area relative to the performance standards at 310 CMR 10.55(4)(b) (unless varied), the design plans, and performance criteria established by MADEP in the variance conditions (when applicable), and the reference wetland.
- Recommendation for a corrective plan of action if needed.

ITEM 755.76 (Continued)

Reports shall be submitted to the Engineer as a digital copy in Portable Document Format (PDF) unless otherwise requested. Hard copies shall be provided as requested by the Engineer. All reports shall be marked with the applicable permit numbers and identifying information as required in the

permits. Reports shall include photo documentation of the wetland/s being monitored and shall include a minimum of 3 views from different orientations. Views shall be labeled.

Spring Reports, when required, shall be submitted to the Engineer by July 1 for dispersal to the appropriate permitting agencies.

End of Year Reports (which may serve as the Fall Report) shall be based on inspections that occur prior to October 15th. Reports shall be submitted to the Engineer no later than November 1 of each year.

Monitoring Reports shall be as follows for **2** years:

- MassDEP: 1 Report
- ACOE: 1 Report
- Conservation Commission: 1 Report

BASIS OF PAYMENT AND METHOD OF MEASUREMENT

Work under this Item shall be paid by the Contractor bid price for Item 755.76 Wetland Monitoring Reports and associated inspections per Lump Sum and shall include all labor, materials, equipment, and all incidental costs required to complete the work. Lump Sum will be paid in equal installments of the Lump Sum divided by the number of reports submitted. Payment shall be upon submittal and acceptance of each report.

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor shall be fully responsible for compliance with the most recently issued CGP and any subsequent revisions. Should a fine or damages be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) day review period commencing from the date on which EPA enters the Notice into their database. Based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. The contractor shall prepare the SWPPP and update it as necessary. The Contractor shall submit the Plan to the Engineer for approval at least four (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, regulations, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

ITEM 756. (Continued)

In addition to the CGP requirements for inspections, MassDOT requires inspection of all erosion controls and site conditions on a weekly basis. Inspections are also required at portions of sites that discharge to sediment or nutrient impaired or high quality waters per the CGP when each incidence of rainfall exceeding 0.25 inches in twenty-four hours or after snowmelt discharge from a storm event that produces 3.25 inches or more of snow within twenty-four hours occurs. The CGP requires that inspections be performed by a qualified individual as outlined in the CGP. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The inspector's qualifications shall be submitted to the Engineer for approval prior to beginning any work. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. The Standard Specifications require adequate erosion control for the duration of the Contract. All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating conditions and shall consider replacement of erosion controls for each construction season.

The work under this Item shall also include the preparation, submission and implementation of a Flood Contingency Plan. The plan shall address the potential need for the temporary relocation of construction and auxiliary equipment situated within the 1% annual chance of flooding zone to designated upland locations above the Base Flood Elevation during flood events. The Flood Contingency Plan shall address any additional MassDEP-required information requirements, as applicable. The Flood Contingency Plan shall be submitted to the Engineer for review and approval at the same time as the SWPPP.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, preparation of monthly reports and Flood Contingency Plan. In addition, any erosion controls beyond those specified in bid items which are selected by the

ITEM 756. (Continued)

Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this Item.

The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization ("immediately", i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate. The permittee shall use EPA's website to prepare and submit the NOT.

BASIS OF PAYMENT

Item 756 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, SWPPP & Flood Contingency Plan preparation, revisions/addenda during construction, monthly reports, filing fees, and all incidental costs required to complete the work.

Payment of 50% of the Lump Sum price of this Item will be made upon acceptance of the NPDES Stormwater Pollution Prevention Plan & Flood Contingency Plan.

Payment of 40% of the Lump Sum price of this Item will be will be paid in equal monthly installments distributed across the time remaining in the accepted baseline schedule until substantial completion.

The remaining 10% of the Lump Sum price of this Item will be paid following accepted submission of a Notice of Termination (NOT) when final stabilization has been achieved.

ITEM 765.21 ANNUAL COVER CROP FOR NATIVE SEEDING POUND

Work under this Item shall conform to the relevant provisions of Subsection 765 of the Standard Specifications and the following.

DESCRIPTION

Work consists of furnishing and applying the appropriate annual grass to be seeded as a cover crop in conjunction with upland native seeding and at the rate specified herein.

A cover crop shall be used for following conditions:

- when specified under Application Rate for the permanent native upland seed mix
- for slopes 2:1 or steeper and an annual is not already specified as part of the permanent mix
- when seeding out of season and the native seed mix does not already specify an annual
- as required to prevent erosion until the permanent seed establishes.

A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Annual rye (*Lolium multiflorum*) will not be accepted as an annual cover crop.

Using annual rye or exceeding the application rate such that a dense stand of annual grasses prevents germination of the native grasses will require mowing of annual grasses. In this instance, mowing of cover crop will be incidental to this Item.

Seed and Application Rate

Add 30 pounds/acre of the following seed based on seeding season:

Avena sativa (Grain Oats):	1 January to 31 July
Cecale cereale (Grain Rye):	1 August to 31 December

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Annual Cover Crop will be measured for payment per pound of seed, complete in place.

Annual Cover Crop will be paid at the contract unit price per pound upon approval of seed bag tags or other documentation of correct application rate and species, and upon acceptance of a satisfactory stand of annual grasses three weeks following seeding.

Application and care of cover crop will be paid for separately under Item 765.635 Native Seeding and Establishment

ITEM 765.412 SHORT GRASSLAND MIX – SANDY SOILS POUND

Work under this Item shall consist of furnishing the mix(es) specified below in the required quantity.

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

Number of tags submitted must correspond to number of bags delivered.

Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section

ITEM 765.412 (Continued)

6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

Application Rate

Mix 1: 100 lbs/acre PLS.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

ITEM 765.412 (Continued)

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] *PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).*
[2]*Quantity delivered should match pounds* ***Total Pounds PLS*** *and* ***Verification of Seed Delivery****. Pounds should be shown on each Seed Tag.*

ITEM 765.412 (Continued)

SUPPLIER VERIFICATION OF SEED DELIVERY FOR MASSDOT PROJECTS

Date_____

We hereby certify that (*Seed Supplier*):_____

Furnished to (*Contractor*): _____

For use on: (*Project Description*) _____

Project #: _____ Contract #: _____

Pounds of Pure Live Seed: _____

Of Mix (*Description*): _____

Lot Number _____

The material was delivered on (*Date*)_____.

The labels and contents meet all State and Federal regulations. The mixture consists of the following species, including cultivars (as applicable) and ecotype region, and at the following percentages (may be attached separately):

Name (print): _____ Title: _____

Supplier:

ITEM 765.412 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Short Grassland Mix – Sandy Soils will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Short Grassland Mix – Sandy Soils will be paid at the Contractor bid price per Pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Cover crop not included as part of the permanent mix composition will be paid for under Item 765.21, Annual Cover Crop.

Application and care of native seed mix will be paid for separately under Item 765.635 Native Seeding and Establishment.

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

The work under this Item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term "grass" shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

ITEM 765.635 (Continued)

Water

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer’s instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

ITEM 765.635 (Continued)

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

Cover Crop

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes.

A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

ITEM 765.635 (Continued)

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The Contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

ITEM 765.635 (Continued)

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
    - At least 3 types of the permanent seeded grass species shall be visible.
    - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

ITEM 765.635 (Continued)

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. **Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance.** Seeding that shows good germination and is determined by the Engineer and Landscape Architect to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

Native Seeding and Establishment will be paid at the Contractor bid price by the square yard upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed and cover crop mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project. If used, Compost Blanket shall be compensated under the respective item.

Mowing for weed control will be paid as specified under Item 765.664.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment

ITEM 765.664 MOWING FOR NATIVE SEED ESTABLISHMENT SQUARE YARD

DESCRIPTION

Item 765.664 Mowing for Native Seed Establishment shall be used solely for the purpose of weed management for upland native seed establishment, only when required by the Landscape Architect and the Engineer, and only during the period prior to weed seed dispersal as specified herein unless otherwise directed.

METHODS

Mowing shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall not occur when ground or grasses are wet. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Mowing for Native Seed Establishment will be measured for payment per Square Yard of area mowed complete in place.

Mowing for Native Seed Establishment will be paid at the Contractor bid price per Square Yard of area mowed and upon completion during the approved period for mowing as described under Methods. Payment shall include all labor, materials, equipment, traffic controls, and all incidental work required for satisfactory completion of mowing.

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this Item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier. Photo-biodegradable fabric shall not be used.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, sedimentation fence shall be used in addition to compost filter tubes and straw bales and shall be compensated under that item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. If necessary to accommodate field conditions and to maximize effectiveness, barrier locations may be shifted with approval from the Engineer. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

ITEM 767.121 (Continued)

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer's instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

ITEM 767.121 (Continued)

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

Sedimentation Fence

Materials and Installation shall be per Subsections 670.40 and 670.60 of the Standard Specifications and the following:

Sedimentation fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Subsection 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

ITEM 767.121 (Continued)

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and sedimentation fence, shall be removed and disposed off-site by the Contractor.

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Sedimentation fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the Contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 767.9 **JUTE MESH** **SQUARE YARD**

The work under this Item shall conform to the relevant provisions of Section 700 of the Standard Specifications and the following.

The work under this Item shall consist of furnishing and installing jute mesh fabric to prevent soil erosion. Jute mesh shall be placed over all areas of exposed soil in locations shown on the plans or as required by the Engineer.

MATERIALS

Jute netting or similar material shall be new, unused, undyed, and unbleached 100% biodegradable yarn (no polypropylene) and of uniform plain weave. The materials should weigh approximately 1.0 (+/- 5%) pounds per linear yard (assuming a 4-foot width).

Shall meet the following minimum requirements:

Open Area:	70-75%
Mesh Size:	approximately 1/2 inch with an open area of 60-65%.
Roll Weight:	approximately 1.0 (+/- 5%) pounds per linear yard
Warp Ends:	78 per linear yard
Weft Ends:	41 per linear yard
Recommended flow:	6 fps (1.8 m/s)
Functional Longevity:	6-9 months

Anchoring devices shall be 11-gauge steel staples 6-inch minimum length. In loose soils the length of the staples shall be 9-inches.

For areas that will be routinely mowed anchoring devices shall consist of minimum 8” wooden stakes. Longer stakes shall be used where loose soils or other conditions obligate, as required by the Engineer.

CONSTRUCTION METHODS

Area shall be seeded prior to installation of jute netting.

Installation shall be such as to ensure continuous contact with soil without folds or wrinkles. Jute netting shall be laid such that upslope fabric is placed over lower slope fabric by a minimum of 3 feet. Adjoining rolls shall be overlapped a minimum 6 inches. The netting shall extend beyond at least 1 foot beyond the edge of the seeded area.

The Contractor shall bury the ends of the jute netting 6-8 inches in anchor trenches at top and bottom of slopes.

ITEM 767.9 (Continued)

Jute netting shall be anchored in place with vertically driven metal staples. The staples shall be driven in until their tops are flush with the soil. Staples shall be placed at 12-inch intervals along the top of a slope and in staggered courses along the face of the slope to achieve a minimum of 3 staples per square yard, or at manufacturer's recommendations for the given site conditions.

Contractor shall reseed all trenched and otherwise disturbed areas with specified seed mix. The Contractor shall maintain the jute netting and make satisfactory repairs of any areas damaged until acceptance of seed establishment.

METHOD OF MEASUREMENT

Jute Mesh will be measured by the number of SQUARE YARDS complete in place, including anchoring, as measured across the surface of grade and does not include buried or overlapped portions. The quantity measured for payment shall not exceed that shown on the plans or as directed by the Engineer.

Mesh that becomes loose or that is not otherwise functioning to stabilize soil shall be repaired and new or additional jute matting installed as required at the Contractor's expense. Soil erosion shall be repaired, and area shall be raked and reseeded with the original specified mix as required by the Engineer at the Contractors expense.

BASIS OF PAYMENT

Item 767.9 will be paid for at the Contract unit price per SQUARE YARD, which price shall include all labor, materials, equipment, trenching, placing, and stapling of jute fabric, reseeding of trenched and disturbed areas, and all incidental costs required to complete the work.

ITEM 776.543	**MAPLE – RED – OCTOBER GLORY 2-2.5 INCH CALIPER**	**EACH**
ITEM 777.328	**OAK – WHITE 2-2.5 INCH CALIPER**	**EACH**
ITEM 779.328	**ELM – PRINCETON 2-2.5 INCH CALIPER**	**EACH**
ITEM 783.467	**TUPELO 2-2.5 INCH CALIPER**	**EACH**
ITEM 794.803	**SWEETFERN #1**	**EACH**
ITEM 795.155	**WINTERBERRY – FEMALE 18-24 INCH / #1**	**EACH**
ITEM 796.201	**LITTLE BLUESTEM – 1 GAL**	**EACH**
ITEM 796.471	**BEACHGRASS – AMERICAN BARE ROOT**	**EACH**

The work under these Items shall conform to the relevant provisions of Subsection 771 of the Standard Specifications and the following:

The work under these Items shall include all labor, materials, and equipment necessary to furnish and plant and/or transplant specified trees, shrubs, ground cover to locations as shown on the plans and/or directed by the Engineer.

SAMPLES AND SUBMITTALS
Beachgrass submittals: At least 180 days prior to planting of beach grass. Submittal shall include certification of the species of plant, and certification that the total quantity of beachgrass plants of each type will be available at the scheduled planting time.

MATERIALS
BEACHGRASS:

Beachgrass – Bare Root plants shall be dormant stock, and shall be provided with a minimum of two stems per plant unit.

Sand Much for beachgrass plantings shall be uniformly graded medium to coarse sand consisting of clean, inert, rounded grains of quartz or other durable rock free from loam or clay, surface coatings and deleterious materials with the following gradation

	Percent Passing	
U.S. Sieve Size Number	Minimum	Maximum
10	100	--
18	60	80
35	25	45
60	8	20
140	0	8
270	0	3
0.002mm	0	0.5

ITEMS 776.543 through 796.471 (Continued)

CONSTRUCTION METHODS

SUPPLEMENTARY BEACHGRASS PLANTING

REQUIREMENTS: SEASONS FOR PLANTING BEACHGRASS:

Beachgrass – Bare Root planting season: Dormant bare root beachgrass shall be planted between October 1 through April 15, but only when ground is not frozen.

Beach Grass plantings shall be made directly into approved Sand soil, with no additives except fertilizers as specified herein. Plant beachgrass bare root plants in accordance with recommendations of source nursery.

PLANTING BEACHGRASS BARE ROOT:

In areas of Beachgrass – Bare Root plantings, the 3 inch Sand Mulch layer shall be spread prior to the installation of the bare root plants. Beachgrass Bare Root shall be planted so that the bottom of the bare-root plant is approximately 7-8 inches below finish grade of the Sand Mulch. Each Beach grass – Bareroot unit shall be provided with two bare root stems.

FERTILIZING BEACH GRASS:

For beachgrass plantings, Contractor shall provide a minimum of three fertilizer applications during the growing season over the first year after planting, one application in spring, one application in early summer, and one application in late summer. The initial application of high- nitrogen fertilizer of the beachgrass areas shall occur 30 days after planting.

Fertilizer to be used only for three applications over beach grass area timed through a full growing season shall be a high-nitrogen, lower phosphorus inorganic granular fertilizer, N-P-K analysis 30-10-0 or 16-8-8.

Fertilizer timed release option for beachgrass areas shall be an 18-month controlled-release fertilizer, formulation 19-6-12, nutrients encapsulated in resin-coated pellets.

FERTILIZING FOR TREE, SHRUB, AND PERENNIAL PLANTINGS:

Nutrient composition of fertilizers for tree, shrub, and perennial plantings shall be as recommended by the soil testing lab, based on the nutrient analysis portion of the topsoil/loam tests.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 776.543, 777.328, 779.328, 783.467, 794.803, 795.155, 796.201 and 796.471 will be measured and paid for in accordance with Subsections 771.80 and 771.81 of the Standard Specifications.

ITEM 812.992 ORNAMENTAL LIGHT FIXTURE TYPE A (PEDESTRIAN) EACH

The work under this Item shall conform to the relevant provisions of Subsections 813 and 820 of the Standard Specifications and the following:

The work under this Item shall include all labor, materials, and equipment necessary to furnish and install Streetlights complete and ready for operation. See Contract Drawings for locations of each type of streetlight.

The work under this Item shall include, but not be limited to, the installation of Ornamental light poles, light fixtures, bulbs, ballasts, receptacles and appropriate grounding. Contractor shall provide all labor, materials, equipment, tools, supplies and transportation involved in the installation of electrical equipment as specified.

All work under these and other electrical systems shall conform to the requirements of the Electric Utility and the Mass Electrical Code.

SUBMITTALS

Submittals for lighting equipment shall include photometric data. Shop drawings and reports shall employ the terminology, classifications, and methods prescribed by the IES Lighting Handbook, as applicable, for the lighting systems specified. Manufacturer's data shall be submitted for the following:

- Luminaires, including lamps, ballast.
- Lamp Sockets and Lampholders
- Independent Testing Laboratory Photometric Data
- Lighting standards and mounting Brackets.

Shop drawings shall be submitted for the following:

- Luminaire type: fabrication and assembly drawings and paint finish process.
- Lighting standards: including base details, dimensions, wind loading, EPA ratings, pole deflection, and other applicable information.
- Wind load calculations verifying conformance to AASHTO publication "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", 2009 addition. Calculations and shop drawings shall be stamped by a Professional Engineer Registered in the Commonwealth of Massachusetts
- Light Pole Foundation

MATERIALS

Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the Mass Electric Code (MEC), and all local codes.

Materials shall be manufactured in accordance with the standards indicated in this Section, and typical industry standards and codes for the products specified.

ITEM 812.992 (Continued)

The materials used shall be new, unused, and of the best quality for the intended use. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation. The required information should be marked on durable nameplates that are permanently fastened to the equipment.

Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment (excluding light poles) shall not be stored outside exposed to the elements. If any equipment or apparatus is damaged, such damage shall be repaired at no additional cost, or replaced at no additional cost as directed by the Engineer.

Foundations

Cylindrical foundations for Ornamental light poles shall be specified by lighting manufacture, including number, type and location of anchor bolts. Foundations shall be made of minimum 5,000 psi concrete (at 28 days) and have steel reinforcement meeting ASTM A-615, grade 60 (cover to steel, 1" minimum). Foundations shall have a minimum of two (2) 1 1/4" PVC conduits for lighting circuits, 180 degrees apart.

Foundations to be installed flush with finished grade in sidewalk areas.

Wire & Cable

Unless otherwise noted, conductors for power, lighting, and grounding above grade shall be No. 12 through No. 8 AWG, NEC type XHHW stranded copper, meeting the requirements of UL 83. Conductors for power and lighting shall be no smaller than No. 12 AWG.

All conductors shall be annealed copper, 98% conductivity, Class B stranded, except conductors used for power and lighting circuits No. 10 AWG and smaller which may be solid. All conductors should be rated for 600 volts or less, with a thermal rating of 90° C.

The outside covering of all wiring for power, lighting, grounding, and control uses shall be color coded to identify polarity as follows:

Phase	Color
A or 1	Black
B or 2	Red
C or 3	Blue
Neutral	White
Equipment Ground	Green

Street Light – Type LP

This portion of the work shall consist of furnishing and installing ornamental light poles, identified as Type LP as detailed on the Contract plans.

Poles shall be a cast aluminum, fluted tapered style and as detailed on the drawings. Poles shall be manufactured by Hapco (Speclines) or equivalent products by Spring City Electrical Manufacturing Co., Inc, or and Millerbernd Manufacturinbg CompanyCo., in compliance with these specifications or approve equal.

ITEM 812.992 (Continued)

Luminaires shall be the "UTLD" decorative post top lantern style and as detailed on the drawings. Luminaire shall be manufactured by Streetworks Speclines or equivalent products by Spring City Electrical Mfg. Co or Street Lighting Equipment Corp. or approve equal.

Lumens: 9356
Color Temp: 3000K
Wattage: 96 Watts
Distribution: IV Wide
LED's: 24
Color: Black (confirm)

CONSTRUCTION METHODS

This Section covers the requirements for installation of materials, proper workmanship, testing, cleaning, grounding, and work methods to be followed by the Contractor. This Section also includes specific instructions and to be used in conjunction with the Contract Drawings. Any discrepancies noted between the Specification, Drawings, and actual installation shall be reported immediately to the Engineer. Failure on the part of the Contractor to report discrepancies immediately will be considered negligent.

Work will be coordinated such that systems can be properly located, and conflicts and delays are avoided. Contractor shall consider commencement of work acceptance of existing conditions.

Materials & Workmanship
Work shall be executed in workmanlike manner and shall present neat, rectilinear and mechanical appearance when completed. Material and equipment shall be new and installed according to manufacturer's recommended best practice so that complete installation shall operate safely and efficiently.

Remove all debris caused by Contractors' work.

Installation of Precast Light Pole Foundations
Contractor shall remove and existing sidewalk materials, curbing and other masonry to be replaced after light pole foundation is replaced. Existing soil shall be excavated out and disposed of, taking care to not damage surrounding structures, electrical conduits and other utilities. Contractor to barricade areas disturbed until fully repaired unless directed otherwise.

New precast light pole foundation shall be installed in locations as shown. New 2" PVC electrical conduit connections should be attached to new light pole foundation, to maintain continuity of conduit system. New light pole foundation shall be installed level and plumb with existing conditions and at appropriate height above finished grade.

ITEM 812.992 (Continued)

Grounding

Grounding of all Ornamental light poles and fixtures shall be in accordance Section 250 of the latest edition of the Mass Electrical Code. Equipment bonding conductor shall be installed from branch feeder circuit into adjacent electric handhole and into light pole base. Bonding conductor to be permanently attached to metal light pole per grounding stud provided by manufacturer or field installed if not provided. Bonding conductor to be bonding to metal handhole cover, if present. Provide #10Awg copper bonding conductor vertically up length of pole shaft along with power conductors and bond to fixture ground stud. Test all bonding conductors to be continuous back to source. Perform ground resistance test at each pole location. Should ground resistance be less than 25 ohms, the Contractor shall provide additional ground rod electrode at pole foundation, in accordance with MEC requirements and re-test to determine if resistance is below 25 ohms. Report all instances where ground resistance is above 25 ohms. All grounding conductors to be provided with either green outer jacket or green marking tape.

Testing, Inspection & Cleaning

Test wiring and connections for continuity and grounds before fixtures are connected; demonstrate insulation resistance by megger test as required at not less than 500 volts. Insulation resistance between conductors and grounds for secondary distribution systems shall meet Mass Electrical Code (MEC) requirements.

Test lighting fixtures with specified lamps in place for 100 hours. Replace lamps that fail within 1 year after acceptance.

Installation of Lighting Fixtures

Verify construction of light pole foundations is suitable, and provide fixtures, poles, hardware, and other accessories suitable for construction encountered.

Contractor to provide (furnish and install) new Ornamental light poles and light fixtures. These light poles and fixtures shall be installed on precast concrete foundation, in locations as indicated on the Contract Drawings. Contractor to provide poles and fixtures. All poles are to be provided with factory installed 120V weatherproof receptacle, mounted near the top of the pole. Contractor to provide necessary field wiring for all light fixtures and receptacles. Light poles to be installed with one set of galvanized steel washers and nuts, sized per manufacturer's requirements.

Coordinate installation of fixtures with installation of surrounding materials. Investigate lighting fixture locations and foundation supports to ensure that no interference exists between lighting fixtures, supports, and other equipment including that provided by other trades. Report any possible interference's to the Engineer.

Install 4/C - #10 Awg cable (2 hot, neutral and ground) from each light fixture to light pole base; to be connected to #6 Awg cable feeder from metering cabinet. Contractor shall wire fixture, per manufacturer's instruction.

ITEM 812.992 (Continued)

METHOD OF MEEASUREMENT

Item 812.992 will be measured for payment by the EACH ornamental light fixture Type A (pedestrian) installed, complete in place.

BASIS OF PAYMENT

Item 812.992 will be paid for at the Contract unit price per EACH, which price shall include furnishing and installing new luminaires, posts and bases, internal wiring, testing, assembly, all cable and wire, conduit (not otherwise provided under other items in the contract) and all labor, equipment, submittals, and miscellaneous materials, and all incidental costs required to complete the work.

Conduit, Handholes, Foundations and Wire will be paid for under their respective Items.

ITEM 813.521 WIRE TYPE 10 - # 10 GROUNDING AND BONDING FOOT

The work to be done under this Item shall conform to the relevant provisions of the Subsections 801, 813, and 820 of the Standard Specifications and the following:

The Contractor shall be required to furnish and install all materials, equipment and labor necessary to completely wire and operate the street lighting system. All materials and wiring procedures shall conform to the specifications contained herein and to the requirements and standard practices of Section 800 of the Standard Specifications and the following:

All wire and connectors shall conform to the standards of the National Electrical Manufacturers Association or the Underwriters' Laboratories, Inc., whichever is applicable. All materials and workmanship shall conform to the requirements of the National Electrical Code, Standards of the American Society for Testing and Materials, and any local ordinances that may apply. Wherever any reference is made to the standards mentioned above, the reference should be construed to mean the standard that is in effect on the day the Notice to Proceed to the Contractor for the work is dated.

Wire sizes shall be based on American Wire Gage (AWG), as applied to copper conductors.

SUBMITTALS

Submittals for wire and splice materials shall be made in a timely fashion including all manufactures data sheets, and shop drawings, as applicable, and specified herein.

MATERIALS

The conductor shall be composed of soft drawn 7-strand copper of the gauge shown on the drawings. The insulation shall be installed as a single jacket of cross-linked polyethylene of Underwriter's Laboratories Type USE-2 or RHH-2-RHW-2 rated at 90 degrees C continuous in wet and dry locations, 600 volt as per the National Electrical Code.

Wire and cable furnished and used shall be new and shall have the size, grade of insulation, voltage and manufacturer's name permanently marked on the outer covering at regular intervals. Wire and cable shall be delivered to the site in complete coils or reels with identifying size, type SS-111 and insulation tags. Wire and cable shall be protected from weather and damage during storage and handling.

SPLICING MATERIALS AND METHODS

Splicing shall be in accordance with the Contract drawings and the MassDOT standard specifications. All splices shall be suitable for wet locations, including splices in pole bases and load centers. Use of wire nuts is prohibited. Connections in the pole top shall be with insulated pressure connectors.

ITEM 813.521 (Continued)

CONSTRUCTION

No wire shall be drawn in to any conduit until all work that may cause damage to the wire is complete.

All wire shall be continuous from light pole to light pole without running splices in conduits or handholes. Splices are prohibited in handholes except ground conductor.

All wire terminals, taps and splices shall be made secure with connectors, splicing materials and methods as hereinafter specified.

All incoming wires and outgoing wires in highway lighting load centers, handholes and poles shall be banded as indicated on the Contract drawings.

GROUNDING

Coatings and rust on conduits and grounding rods shall be removed at the location where the ground fittings are to be installed.

The bare copper conductor shall be connected to the continuous insulated bonding lead, which shall be identified with green plastic marking tape as noted in the specifications. Bonding leads for lighting fixtures on poles shall be an insulated #10 AWG, marked green, which shall be extended to the nearest handhole and interconnected to the bare copper ground wire in the handhole of gauge shown on the Contract drawings and the pig tail conductor shall be connected to the ground rod. The ground wire shall also connect to the ground lug on the handhole frame and be bonded to the handhole cover.

A conductor with the same insulation of the power leads shall be installed in all conduits as a continuous bond wire. All bonding leads from fixtures, pole, control boxes, fittings and ground rods shall be connected to the continuous insulated bonding lead which shall be identified with green plastic marking tape as noted in the specifications.

All grounding shall conform to the applicable provisions of the National Electrical Code. SS-112

FIELD TESTS

Upon the completion of each wiring system, and before any connection is made to operating equipment, the Contractor shall perform, in the presence of the Engineer, the following tests of each circuit to determine whether the installations are in acceptable working order.
a. Tests for continuity
b. Tests for ground
c. Tests for insulation resistance (Megger Test) from circuit wires to ground, and between circuit wires.

ITEM 813.521 (Continued)

Tests for ground shall be performed in accordance with the relevant provisions of Subsection 813 Standard Specifications. The entire electrical wiring system shall be tested for continuity, grounds, resistance to ground, insulation, shorts and opens. This shall be done by means of a megohm meter test. After installation of the wiring system is complete with the required splices, the lamp ballast primary shall be disconnected and each circuit shall be tested with a 1000 volt megger. Tests on each circuit shall be between each conductor. When the measured value is less than 200 megohms between two conductors, the Contractor shall locate the point or points at fault, make proper corrections, and then demonstrate by further test the elimination of such faults. These tests shall be performed in the presence of the Engineer.

The test results shall be submitted to the Engineer for review and approval. If any results are questionable or inconsistent, the Contractor shall repeat the tests and make any necessary corrections at the request of the Engineer. No wiring system will be accepted until these are satisfactorily performed and approved.

The Contractor shall furnish the Engineer with a report of the megohm-meter readings for a permanent project record.

All tests and any necessary repairs or replacements that are indicated by the Engineer to produce a fault-free system will be performed at the Contractor's expense.

WARRANTIES

The Contractor shall provide a performance warranty for six months after the work is completed and accepted by the Engineer on the entire work performed under this Contract including the performance of all equipment and components of the highway lighting system specified. The performance warranty responsibility of the Contractor shall commence after official acceptance by the Engineer. NOTE: The Contractor shall be completely responsible for all maintenance, repairs and replacement of damaged equipment during the functional test and throughout the performance warranty period.

If within 48 hours after notification by the Engineer of a malfunction, and the Contractor fails to make such repairs as necessary, the Engineer will undertake repairs of which all costs are to be borne by the Contractor. The cost of any maintenance necessary, except electrical energy, shall be at the Contractor's expense and will be considered as included in the price paid for the Contract item involved and no additional compensation will be allowed therefore.

METHOD OF MEASUREMENT

Item 813.521 will be measured for payment by the FOOT od wire Type 10 - #10 grounding and bonding installed, complete in place.

BASIS OF PAYMENT

Item 813.521 will be paid for at the Contract unit price per FOOT, which price shall include furnishing, installing and connecting the street lighting cables, the grounding of the system, testing the lighting circuit wiring, grounding wire testing, and for furnishing any equipment and/or materials required, and all incidental costs required to complete the work. The cost of any maintenance necessary to include testing, replacement of lamps, luminaires, wiring splices, grounding, and all appurtenances, except electrical energy, shall be at the Contractor's expense and will be considered as included in this Item.

ITEM 823.61 HIGHWAY LIGHTING LOAD CENTER NO. 1 LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsections 801 and 820 of the Standard Specifications and the following:

The work under this Item shall include, but not be limited to, the installation of all electrical wiring and cabling for the entire load center system, meter sockets, electrical metering, control cabinet, distribution panels, circuit breakers, GFI receptacles (where specified), lighting controls, appropriate grounding all in accordance with the applicable provisions of Subsections 813 and 820 of the Standard Specifications. This Item shall also include conduit, cabling and related fees to provide an underground service connection to the local utility Eversource Electric.

SUBMITTALS
List of materials and equipment requiring catalog cut or shop drawings shall include:

1. Rigid Conduit
2. Panelboards
3. Service Cabinet
4. Meter Sockets
5. Disconnect Switch
6. Circuit Breakers
7. Wiring Devices and Receptacles
8. Contactor
9. Photocell

MATERIALS
Materials and products furnished shall be designed for the intended use, shall meet all requirements of the latest edition of the National Electric Code (NEC), and all local codes.

Materials shall be manufactured in accordance with the standards indicated in this Section, and typical industry standards and codes for the products specified. Materials and equipment shall be Underwriter's Laboratory (UL) listed.

The materials used shall be new, unused, and of the best quality for the intended use. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation. The required information should be marked on durable nameplates that are permanently fastened to the equipment.

Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored outside exposed to the elements. If any equipment or apparatus is damaged, such damage shall be repaired at no additional cost, or replaced at no additional cost as directed by the Engineer.

Obtain all necessary permits and licenses, file necessary plans, and pay all fees for permits and inspections. Permit fees are the responsibility of the Contractor as part of his bid.

ITEM 823 61 (Continued)

Wire & Cable

Unless otherwise noted, conductors for power, lighting, and grounding above grade shall be No. 12 through No. 8 AWG, NEC type THWN/THHN, meeting the requirements of UL 83. Conductors for power and lighting shall be no smaller than No. 12 AWG.

All conductors shall be annealed copper, 98% conductivity, Class B stranded, except conductors used for power and lighting circuits No. 10 AWG and smaller which may be solid. All conductors should be rated for 600 volts or less, with a thermal rating of 90° C.

The outside covering of all wiring for power, lighting, grounding, and control uses shall be color coded to identify polarity as follows:

Phase	Color
A or 1	Black
B or 2	Red
C or 3	Blue
Neutral	White
Equipment Ground	Green

Raceways (Conduit)
Rigid Metallic Conduit: UL6 and ANSI C80.1.

Flexible Metallic Conduit: UL1. Liquid tight flexible metal conduit shall be used in wet locations.

Minimum size of conduit shall be 3/4". Unless indicated on Drawings, conduit sizes can be sized in accordance with National Electric Code (NEC). Conduit bends shall not have kinks or flats, and shall not be less than standard radii.

Rigid Galvanized Steel (RGS) conduit shall be used for all power, control signal, and instrumentation wiring, except where noted. Conduit shall be fully threaded at both ends and each length shall be furnished with one threaded coupling.

Conduits shall be made electrically continuous at coupling and connections to boxes and cabinets by means of joining fasteners or copper bond wires. Conduit shall be connected to grounded structural steel or the ground network. After assembly all conduit locknuts, all EMT coupling fittings, and all bond wire screws shall be set up tight before installation of wiring. Insulated metallic bushings shall be used on all conduits entering panel cabinets, handholes, and wiring gutters, except on branch lighting circuits.

Expansion fittings shall be provided on all conduits as required by the latest National Electrical Code, and as required by local and state codes. This includes, but is not limited to, vertical conduit risers coming from below-grade.

ITEM 823 61 (Continued)

Wiring Devices

Wiring Devices: NEMA WD 1.

Wiring devices for shall be specification grade, 20 ampere, ivory with Type 302 stainless steel plates. Ground fault current interrupting (GFCI) devices shall be provided where specified and/or required by applicable codes.

Panelboards
Panelboards: NEMA PB1, and UL 67.

Panelboards shall be door-in-door construction with copper bus. Circuit breakers shall be molded case, thermal magnetic, bolt-on type rated as noted, and rated to match panelboard voltage and interrupting rating (22kA minimum). Circuit breakers should be capable of accepting up to #4 Awg wiring.

Panelboard to be 100A, 1-phase, 120/240V (or 120/208V) with circuit breaker minimum quantities as shown on Contract Drawings. Provide 100A/2Pole main circuit breaker in panel, and sufficient breakers for lighting circuits and receptacle in cabinet.

Meter Sockets
Meter Sockets: UL 414, UL 486B, and ANSI C12.7.

Outdoor meter sockets are to be NEMA 3R, and have vandal-proof covers to protect utility kWh meters (if specified). Unless otherwise noted, meter sockets shall be ringless, with lever bypass, tin plated connections, and have provision for a fifth terminal on single-phase applications.

Meter Socket shall be either heavy duty or medium duty, 200 ampere, ringless, 5 terminal, with approximate dimensions of 19”H x 13”W x 5”D. (Milbank U9319-XL, Eaton UAT215-BCH, Hubbell HD200-5RLB, or approved equal. Socket to meet local utility requirements.

Metering Cabinets
Provide outdoor NEMA 3R metering cabinet. Contractor to size cabinet to coordinate with sizes of panelboard and equipment to be installed within cabinets. Dimensions shown are typical and are for reference only. Cabinet to include all equipment shown or implied and all equipment shall be installed inside of cabinet without physical conflicts and per NEC. Cabinet to be sized for all necessary conduits, whether active, spare or future as listed on panelboard schedules.

Cabinets to be manufactured from 14 gauge minimum stainless steel with 12 gauge steel panel, mounted inside. Cabinets to have integral keyed locking mechanism, keyed alike, with provision for pad-lock. Cabinets shall be ventilated type and **factory painted black powder-coat**. Cabinets to have door hold-open latches.

Provide outdoor-rated 100A meter socket mounted on the side of the cabinet to meet local utility requirements.

ITEM 823 61 (Continued)

Provide non-fused safety switch, rated 100A, 1-phase, 240V maximum, 2-pole inside of cabinet, per local utility requirements.

Metering cabinet to be installed on new concrete foundation as shown and as directed. Contractor responsible for coordinating foundation dimensions to be 6-inches wider than cabinet.

CONSTRUCTION METHODS

This Section covers the requirements for installation of materials, proper workmanship, testing, cleaning, grounding, and work methods to be followed by the Contractor. This Section also includes specific instructions and to be used in conjunction with the Contract Drawings. Any discrepancies noted between the specification, Drawings, and actual installation shall be reported immediately. Failure on the part of the Contractor to report discrepancies immediately will be considered negligent.

Work will be coordinated such that systems can be properly located, and conflicts and delays are avoided.

Materials & Workmanship

The Contractor's work shall be executed in workmanlike manner and shall present neat, rectilinear and mechanical appearance when completed. Material and equipment shall be new and installed according to manufacturer's recommended best practice so that complete installation shall operate safely and efficiently.

Testing, Inspection & Cleaning

The Contractor will test wiring and connections for continuity and grounds before fixtures are connected; demonstrate insulation resistance by megger test as required at not less than 500 volts. Insulation resistance between conductors and grounds for secondary distribution systems shall meet National Electrical Code (NEC) requirements.

Grounding

The Contractor shall ensure bond and ground equipment and systems connected under this Section are in accordance with standards of the NEC and other applicable regulations and codes.

The Conduit system shall be electrically continuous throughout, grounded at service entrance. Equipment frames, enclosures, boxes, etc. shall be grounded by use of green-jacketed (or bare copper) ground, sized as per Table 250-95 of the NEC.

Green bonding jumper shall be installed in flexible conduits.

Copper fittings for ground connections shall conform to the requirements of ASTM B 30. All bolts, u-bolts, cap screws, nuts, and lock washers for copper fitting shall be of approved corrosion-resisting material.

Ground Rods shall be 5/8" diameter and 8' in length, solid copper as required by applicable codes (NEC, NESC). Bonding connections to ground rods shall be permanent, welded or crimped, with copper connectors. All wire used for grounding shall be no smaller than #4 Awg copper, stranded conductor.

Contractor to provide two (2) 5/8" x 8'-0" copper ground rods, to be installed around the base of the new metering cabinets. Grounding to be installed per installation detail.

ITEM 823 61 (Continued)

Electrical Service Conduit Installation
Conduit sweeps at metering cabinet shall be rigid galvanized steel (RGS), 36" minimum radius (as required by Utility). Provide 3-conductor, #3/0AWG 600V service cable with ground to utility manhole or transformer for new 100A service to metering cabinet.

Electrical Metering Control Cabinet Installation
Contractor to provide new outdoor NEMA 3R stainless steel metering cabinet (factory painted color: black), with 100 amp, 5 terminal, meter socket mounted on the side of meter cabinet as indicated on the Drawings. Contractor to coordinate the incoming underground 100-amp service from the utility to the new metering cabinet. Cabinet must be **painted black by manufacturer**, as field painting is not acceptable.

All exposed hardware fittings and the like shall be colored flat black.

Contractor shall co-ordinate with Eversource Electric on connections to riser pole. The Contractor shall connect conductors at service pedestal and the utility to connect make the connection to its system. Contractor shall be responsible for all charges and fees assessed by Eversource Electric. Eversource Electric charges and fees are incidental to Item 813.80.

BASIS OF PAYMENT

Item 823.61 will be paid for at the Contract price per LUMP SUM, which price shall include all labor, materials, equipment required to furnish, install and test, complete in place and operational, the load center as specified herein. This price shall include associated electrical components, miscellaneous hardware, service connection and 3 inch rigid steel conduit required for the service connection. It shall also include furnishing and installing all wiring and related connections, splices and hardware and incidental labor and equipment to complete and make operation the entire related lighting and outlet system, and all incidental costs required to complete the work.

ITEM 823.72 HIGHWAY LIGHTING ARM AND LUMINAIRE REMOVED AND RESET EACH

The work under this Item shall conform to the relevant provisions of Subsections 801 and 820 of the Standard Specifications and the following:

The work under this Item shall consist of dismantling and removing the existing highway luminaires and arms from the existing utility poles and resetting them onto the relocated utility poles, as shown on the plans. The Contractor shall contact the Electric Utility Company to coordinate the disconnection and reconnection of the luminaire service wire.

The Contractor shall exercise extreme care in removing, dismantling, transporting, storing, and resetting the existing luminaires and arms. Any equipment damaged or stolen through carelessness or lack of protection by the Contractor shall be replaced at no additional cost.

Work shall be in accordance with the latest edition of the National Electrical Code, Massachusetts Electrical Code, local codes and as directed by the Engineer. All work shall be performed by an experienced electrician licensed in the Commonwealth of Massachusetts, and qualified to perform work on utility poles in the Electrical Space.

If the Engineer determines that an existing lighting arm and luminaire is not suitable to be reset, the Contractor shall notify the Town and verify if the Town would like to salvage the arm and luminaire. If the Town elects to salvage the arm and luminaire, the work shall also include dismantling, removing, and stacking of the arm and luminaire and the Contractor shall arrange a time to deliver and stack the arm and luminaire at the Town's yard. If the Town decides to abandon part or all of the arm and luminaire, said materials shall become the property of the Contractor and shall be legally disposed of.

The Town may also provide a new or refurbished arm and luminaire for resetting under this Item, for new light location or for luminaires unsuitable for resetting.

METHOD OF MEASUREMENT

Item 823.72 will be measured for payment by the EACH highway lighting arm and luminaire removed and reset, complete in place.

BASIS OF PAYMENT

Item 823.72 will be paid for at the Contract unit price per EACH, which price shall include all labor, equipment, materials, any related Utility charges and/or permit fees, all incidental costs required to complete the work.

ITEM 824.62 SOLAR-POWERED FLASHING SIGN ASSEMBLY EACH

This work under this Item shall consist of furnishing and installing a solar-powered, LED-enhanced W2-6 sign assembly, including sign panel, LED lighting components, solar power system, battery backup, controller, and pole, complete and operational, as shown on the plans and as directed by the Engineer.

MATERIALS

The sign assembly shall meet the following requirements:

Sign panel shall be W2-6 Chevron Alignment sign, conforming to the requirements of the MUTCD and MassDOT Standard Specifications Subsections 824, 828, 840 and the following.

LED modules shall be amber in color, integrated within or surrounding the sign legend or border, and be FHWA MUTCD Interim Approval IA-21 compliant or MassDOT-approved equivalent.

System shall include a solar panel, charge controller, and battery backup capable of operating the LED array for a minimum of 5 consecutive days without sunlight.

Flash pattern shall be 50 to 60 flashes per minute or per manufacturer recommendations approved by the Engineer.

Mounting shall be on a breakaway aluminum or galvanized steel post conforming to Subsection 840 and the Construction Standard Details.

All electrical components shall be rated for outdoor use and comply with NEMA 3R or higher.

CONSTRUCTION METHODS

The Contractor shall install each sign assembly at locations shown on the plans or as directed by the Engineer. The solar-powered unit shall be mounted securely to the post, positioned to maximize solar exposure. All wiring shall be concealed and protected from tampering or environmental damage.

The Contractor shall submit shop drawings and manufacturer's cut sheets for approval prior to procurement. The entire assembly shall be tested and demonstrated for functionality in the presence of the Engineer.

METHOD OF MEASUREMENT

Item 824.62 will be measured for payment by the EACH solar-powered flashing sign assembly installed, complete in place.

BASIS OF PAYMENT

Item 824.62 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment, submittals, incidentals, appurtenances, and all incidental costs required to complete the work.

Payment for street sign supports shall be paid for separately under Item 847.1.

ITEM 826.7 ELECTRIC SERVICE RISER RELOCATION EACH

The work under this Item shall conform to the relevant provisions of Subsection 813 of the Standard Specifications and the following:

The work under this Item shall consist of the removal and relocation of electric service risers attached to utility poles supplying secondary electrical service through underground conduit. The existing underground conduit shall be excavated and exposed for a necessary distance to allow for the re-alignment of the conduit to the relocated pole. The existing galvanized riser and sweep at the base of riser shall be removed and reset on the new pole, reconnecting the existing conduit with a split coupling.

The existing wires shall be retained in the conduit during the relocation. If additional lengths of conduit are necessary for the reconnection of the riser to the new pole, split conduit shall be used. New galvanized steel straps shall be used to attach the riser pipe to the utility pole, spaced per utility company recommendations. A ground clamp at the top of riser pipe and weather and wire seals will be installed per Utility Company recommendations.

The work under this Item shall include all excavation and backfill, compaction, and materials or any other requirements in accordance with the latest edition of the National Electrical Code, the respective utility company, local codes and guidelines. The work associated with disconnecting power and reconnecting power to the utilities secondary power lines should be performed at a time convenient to the property owners or tenants occupying the building. The actual time of day or evening for the disconnecting and reconnecting will be agreed upon between the Engineer, Power Company and the property owner/tenant during construction. No additional compensation shall be given for this work outside of normal work hours if necessary.

METHOD OF MEASUREMENT

Item 826.7 will be measured for payment by the EACH electrical service riser relocated, complete in place.

BASIS OF PAYMENT

Item 826.7 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work.

The work associated with the relocation of the utility poles and the transfer of the Utilities overhead primary and secondary wiring shall be the responsibility of the respective utility companies and will not be paid for under this Item.

ITEM 852.11 TEMPORARY PEDESTRIAN BARRICADE FOOT
ITEM 852.12 TEMPORARY PEDESTRIAN CURB RAMP EACH

Description

Work under these Items consist of furnishing, deploying, maintaining in proper operating conditions, and removing temporary pedestrian barricades and temporary pedestrian ramps as part of a Temporary Pedestrian Access Route (TPAR) in order to guide pedestrians around a fully- or partially-closed sidewalk. These devices are intended to prevent pedestrians from entering the work area and to prevent pedestrians from inadvertently entering the vehicle travel lane by providing visual and physical separation between each space.

Materials

The Temporary Pedestrian Barricade shall have a continuous bottom rail or edge no more than two (2) inches above the ground and eight (8) inches in height (minimum) to accommodate cane users, have a smooth and continuous hand railing along the top edge no less than 32 inches above the ground and not obstruct or project into the pedestrian path of travel. Barricade walls shall be nearly vertical and generally within the same plane.

If exposed to traffic, Temporary Pedestrian Barricades shall be crashworthy.

The Temporary Pedestrian Curb Ramp shall provide a 48 inch minimum width, with a firm, stable, and non-slip surface. Protective edging with a two (2) inch minimum height shall be installed when the curb ramp or landing platform has a vertical drop of six (6) inches or greater.

The Temporary Pedestrian Curb Ramp walkway and landing area surface shall be of a solid, continuous, contrasting color abutting up to the existing sidewalk.

If a Temporary Pedestrian Curb Ramp leads to a crosswalk, a detectable warning pad must be used at the base of the ramp; if it leads to a protected path that does not conflict with vehicular traffic then a detectable pad shall not be used.

Construction Methods

The Temporary Pedestrian Barricade shall be placed in an area that will provide pedestrians with a TPAR on a smooth, continuous hard surface for its entirety. The geometry and alignment of the facility shall meet the applicable requirements of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities" and the Massachusetts Architectural Access Board.

The recommended width of the TPAR is 60 inches, but if constraints exist a minimum clear width of 48 inches shall be provided along its entirety. If a 60 inch width cannot be accommodated in full, a 60 inch by 60 inch passing space shall be provided every 200 feet or less along the TPAR.

Turning areas shall be 60 inches by 60 inches minimum.

Lateral joints between any surfaces shall not exceed 0.5 inches. Lateral edges may be vertical up to 0.25 inches high and shall be beveled at 1V:2H between 0.25 inches and 0.5 inches.

ITEM 852.11 and ITEM 852.12 (Continued)

The TPAR shall be kept clear of debris, snow, and ice and the Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall not obstruct drainage.

Removal and/or resetting of Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall be considered incidental.

COMPENSATION

Payment for Temporary Pedestrian Barricades will be made at the Contract price per foot installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

Payment for Temporary Pedestrian Curb Ramps will be made at the Contract price per each unit installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

ITEM 864.35 SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW EACH

The work under this Item shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and the following:

The work under this Item shall consist of furnishing and installing two-way yellow/yellow reflectorized pavement markers (slotted in pavement) in accordance with the relevant provisions of Traffic Standard TR.6.5 "Typical Pavement Markings for Conventional Roadways", and the following:

The work under this Item shall include cutting the tapered pavement slot to the dimensions shown on the Construction Detail issued with Engineering Directive E-05-003 for the two-way markers, application of the manufacturer's recommended epoxy adhesive and placing the reflectorized pavement marker in the proper position within the slot so that the reflectorized face is visible and perpendicular to oncoming traffic and so that the top of the marker is set 1/8± inch below the top of the adjacent pavement. Surface preparation and installation shall be strictly in accordance with the manufacturer's instructions.

Markers shall be installed along the double yellow centerlines as shown in the plans at 40-foot intervals.

MATERIALS

The Contractor shall provide a reflectorized pavement marker form the MassDOT's Approved Products list.

METHOD OF MEASUREMENT

Item 864.35 will be measured for payment by the EACH slotted pavement marker two-way yellow/yellow installed, complete in place.

BASIS OF PAYMENT

Item 864.35 will be paid for at the Contract unit price per EACH, which price shall include all saw-cutting the tapered pavement slot, furnishing and installation of the reflectorized markers, including all labor, equipment, and all incidental costs required to complete the work.

ITEM 866.04 GREEN BICYCLE LANE TREATMENT (MMA) SQUARE FOOT

The work under this Item shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and the following:

The work under this Item consists of furnishing and applying a high-friction, durable, skid resistant green surface treatment to designated areas of bicycle facilites in accordance with these plans and specifications and the Subsection 860 and Section M7of the Standard Specifications.

Before applying any striping, the Contractor shall lay out the proposed striping locations with temporary lines to assure proper alignment. The alignment of all pavement markings shall be approved by the Engineer before installing permanent pavement markings.

All pavement markings shall be complete and installed no later than 14 days after the installation of the final roadway application materials.

MATERIALS

The green surface treatment shall be a methyl methacrylate (MMA)-based, two-component durable pavement marking system. The material shall be green in color, consistent with FHWA Interim Approval IA-14 for bicycle facilities. The system shall be applied at a thickness of 70–100 mils and shall meet the following performance requirements: minimum British Pendulum Number (BPN) of 55 for slip resistance, and a minimum service life of three years under normal vehicular traffic conditions. The treatment shall be applied with broadcast aggregate (such as bauxite) where necessary to achieve required skid resistance. The material shall be from the MassDOT Qualified Construction Materials List (QCML) and shall be installed per the manufacturer's recommendations. Surfaces shall be cleaned of all oil, dirt, and debris prior to application. Concrete surfaces shall be primed if required by the manufacturer. Application shall be permitted only when the surface temperature is 50°F or greater and dry.

METHOD OF MEASUREMENT

Item 866.04 will be measured for payment by the SQUARE FOOT of green bicycle lane treatment (MMA) installed, complete in place.

BASIS OF PAYMENT

Item 866.04 will be paid for at the Contract unit price per SQUARE FOOT, which price shall include all labor, materials, surface preparation, equipment, application, testing, and all other incidental costs required to complete the work. This payment includes layout, primer, aggregate, and waste disposal associated with the green bicycle lane treatment. No separate payment will be made for any additional materials or means required to achieve the required color, thickness, or friction properties..

ITEM 874. STREET NAME SIGN EACH

The work under this Item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following.

The work under this Item shall include the furnishing of new street signs as shown on the plans and attaching same to breakaway Type P-5 square tubular steel post.

The work under this Item shall include all materials, labor and equipment necessary to complete the design, construction, and erection of the signs. Work shall also include, without additional compensation, all hardware, brackets, bolts, labor, etc., required to attach panels.

Street sign sizes, background color, border and legend size and color, shall be as noted on the plans, and as noted in the **11th Edition of Manual of Uniform Traffic Control Devices** with the latest Massachusetts Amendment. Legend shall be FHWA Series D 2000. Street name legends shall consist of 6 inch uppercase letters with 4.5 inch lowercase letters. The Town Seal shall be provided on all street name signs and considered incidental to Item 874. Signs shall be post-top mounted back to back on breakaway Type P-5 square tubular steel posts.

Signs shall be fabricated on Type A sheet aluminum with reflectorized background. All hardware, brackets and fasteners needed to attach each sign panel to a breakaway Type P-5 square tubular steel post shall be included as part of this Item.

METHOD OF MEASUREMENT

Item 874. will be measured for payment by the EACH street name sign installed, complete in place.

BASIS OF PAYMENT

Item 874. will be paid for at the Contract unit price per EACH, which price shall include all tools or equipment, labor, materials, hardware, and all incidental costs required to complete the work.

Payment for street sign supports shall be paid for separately under Item 847.1.

Rock Excavation shall be paid for under Item 144 Class B Rock Excavation.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

The work under this Item shall conform to the relevant provisions of Subsections 828 and 840 of the Standard Specifications and the following:

The work under this Item shall include the dismantling, removal, transporting and resetting of the existing signs at the location indicated on the plans. The work also includes removal and disposal of the existing sign supports and foundations.

The Contractor shall exercise particular care in the dismantling, removal, transporting and resetting of the existing signs designated to be reused. Any sign panel damaged by the Contractor shall be replaced at the Contractor's expense.

Signs, attachment hardware and sign support posts lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored or reset shall be replaced with new material at no additional cost to the Owner. New attachment hardware shall be furnished and installed as necessary to replace any missing or unusable existing hardware.

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas. The existing signs shall not be removed and reset without the permission of the Engineer.

METHOD OF MEASUREMENT

Item 874.2 will be measured for payment by the EACH traffic sign removed and reset, complete in place.

BASIS OF PAYMENT

Item 874.2 will be paid for at the Contract unit price per EACH, which price shall include dismantling, loading, transporting and resetting of the signs as designated above, the excavation, removal and disposal of their supports and foundations, the gravel backfill, surface restoration, all labor, materials, equipment, and all incidental costs required to complete the work.

New posts, if required, will be paid for under Item 847.1.

ITEM 874.4 TRAFFIC SIGN REMOVED AND STACKED EACH

The work under this Item shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

The work under this Item consists of dismantling, removal, transporting and stacking of the existing roadside traffic signs and street signs as required by the Engineer including the removal and disposal of the sign supports and their foundations. Traffic signs shall be carefully removed, transported and stacked on boards at the location designated by the Engineer.

The work under this Item shall include removing the supports, excavating the existing foundation, the disposal of the concrete and supports, the backfilling with compacted gravel of the holes resulting from the excavation and removal of the supports and the replacement, in kind, of any surface material disturbed. The existing signs shall not be removed until the new signs and structures replacing them are ready for installation or until the Engineer orders their removal.

METHOD OF MEASUREMENT

Item 874.4 will be measured for payment by the EACH traffic sign removed and stacked, complete in place.

BASIS OF PAYMENT

Item 874.4 will be paid for at the Contract unit price per EACH, which price shall include all labor, equipment, materials, dismantling, loading, transporting, and stacking the signs and supports as designated above, the excavation and disposal of the existing foundations, the supplying and placing of compacted gravel backfill where foundations and posts are removed, restoration of surface, and all other incidental costs required to complete the work.

ITEM 983.2 **RIPRAP** **CUBIC YARD**

The work under this Item shall conform to the relevant provisions of the Subsection 983 of the Standard Specifications and the following:

The work under this Item consists of furnishing and installing riprap at the infiltration basin and stormwater discharge areas as shown on the plans or as directed by the Engineer.

The Contractor shall be placing the stones upon an approved bed of gravel, crushed stone or other acceptable material, to the lines and grades shown on the plans and as directed. Each stone shall be carefully placed by hand or machine, on a prepared bed, normal to the slope and firmly bedded thereon. The larger stones shall be well distributed and the entire mass of stone shall conform to the gradation specified under Subsection M2.02.0 of the Standard Specifications. All material going into the Riprap protection shall be so placed and distributed that there will be no large accumulations of either the larger or smaller sizes of stone.

METHOD OF MEASUREMENT

Item 983.2 will be measured for payment by the CUBIC YARD of riprap installed, complete in place.

BASIS OF PAYMENT

Item 983.2 will be paid for at the Contract unit price per CUBIC YARD, which price shall include all labor, equipment, materials, transporting, installing the riprap stone, and all incidental costs required to complete the work.

ITEM 996.4 PREFABRICATED MODULAR BLOCK GRAVITY RETAINING WALL SQUARE FOOT

This work under this Item shall conform to the requirements of all relevant Sections of the Standard Specifications and Supplemental Specifications and the following.

The work under this Item shall consist of design, fabrication, furnishing, transportation, and erection of prefabricated modular (PM) block gravity retaining wall system of the required type, including foundation excavation, leveling pad, drainage, backfill, vehicular barrier system, and miscellaneous items necessary for a complete installation.

The PM block wall system shall be a gravity wall system consisting of architectural precast concrete block units supported on dense graded crushed stone leveling pads and select backfill. The wall structures shall be dimensioned to achieve the design criteria shown on the Plans and specified herein. The PM block wall design shall follow the general dimensions of the wall envelope shown in the Contract plans.

Prefabricated modular (PM) block gravity retaining wall system shall be designed and constructed as specified herein. The design shall be subject to review and acceptance by the Engineer. Acceptability of the PM block gravity wall design shall be at the sole discretion of the Engineer. Any additional design, construction, or other costs arising as a result of rejection of a retaining wall design shall be borne by the Contractor.

Retaining Wall No. 1 at the infiltration basin at the Shank Painter Road and Route 6 intersection and Retaining Wall No. 2 at the stormwater outfall along Shank Painter Road between Station 24+09 and 24+78 LT are included under this Item 996.4.

Also included are the final detailing, fabrication, furnishing, transportation, and construction of dense graded crushed stone leveling pads including all associated components, as shown on the Plans.

Acceptable PM block gravity retaining wall systems are:

Redi Rock Retaining Wall™
Stone Strong Retaining Wall
Versa-Lok Standard Retaining Wall
Unilock SiennaStone Retaining Wall

Alternative PM block gravity wall systems shall be an accepted equal upon approval of the Engineer.

Value engineering is not applicable to the work of this Item.

ITEM 996.4 (Continued)

QUALITY ASSURANCE

Quality Assurance shall conform to the requirements of all relevant Sections of the Standard Specifications and Supplemental Specifications and the following.

Fabricator Quality Control

Precast concrete requirements regarding the precast concrete Fabricator's Quality Control (QC), the fabrication plant, personnel, laboratory, testing equipment, inspection, temperature monitoring of the concrete, sampling and testing of concrete, certificate of compliance, and QC documentation shall conform to Section M4 Cement Concrete and Related Materials of the Standard Specifications.

Contractor Quality Control

The Contractor installing the PM block retaining wall shall have a minimum of 5 years' experience constructing the chosen prefabricated block wall system and shall use personnel having demonstrated experience in the installation procedures recommended by the manufacturer and as specified herein.

A qualified representative (minimum 2 years demonstrated experience) from the wall design-supplier shall be present during construction of the PM block walls. The services of the qualified representative shall be at no additional cost to the project. The Contractor shall make the necessary arrangements with the wall supplier to have the technical representative on the project. The qualified experienced technical representative will advise the Contractor and Engineer concerning proper installation procedures. The services of a qualified technical representative shall be incidental to this item.

Quality control and testing shall comply with Section M4 Cement Concrete and Related Materials of the Standard Specifications. Acceptance of a production lot will be as specified in Section M4 Cement Concrete and Related Materials.

Acceptance

Final Acceptance for the prefabricated modular wall system shall be determined by MassDOT.

MassDOT will perform Acceptance inspection and sampling and testing in accordance with Section M4 Section M4 Cement Concrete and Related Materials of the Standard Specifications.

Before proceeding with production, precast sample units shall be provided for the Engineer's acceptance. These samples shall be kept at the plant to be used for comparison purposes during production.

Precast modular block wall units for PM block walls shall be manufactured in a concrete products plant with MassDOT approved facilities.

ITEM 996.4 (Continued)

MATERIALS

All materials used in the construction of the prefabricated block retaining walls shall meet the relevant requirements as specified in Division III, Materials Specifications of the MassDOT Standard and Supplemental Specifications, and as specified herein.

Materials not conforming to requirements of the referenced specifications or from sources not listed in the Contract Documents shall not be used without written consent from the Engineer.

The PM block wall units shall be fabricated in accordance with Section M4 Cement Concrete and Related Materials of the Standard Specifications and Subsection 901. with the following exceptions and additions:

All PM block wall units shall be wet-cast units conforming to ASTM C1776.

The PM wall units shall be manufactured of 4,000 psi, 3/4 inch, 610, air-entrained cement concrete, from a MassDOT approved precaster.

Finishing, Protection, and Curing of Precast Concrete

Unless otherwise indicated on the plans, the concrete surfaces shall be finished in accordance to relevant requirements of Subsection 901 of the Standard and Supplemental Specification and as modified herein.

The blocks shall be cast on a flat area. Each block shall be cast as a unit. No horizontal joints are permitted in a block.

Steel Reinforcement

Steel Reinforcement for PM wall units shall be furnished in accordance with the relevant requirements of Section M8 of the Standard Specifications.

Steel reinforcement manufacturer shall be listed on the MassDOT Qualified Construction Materials List (QCML).

Shear Keys

Precast shear keys shall be made of the same concrete mix as the prefabricated modular units and cured in the same manner. The shear keys are to be designed and detailed by the prefabricated wall manufacturer.

ITEM 996.4 (Continued)

Backfill

All backfill materials used for PM block walls shall be gravel borrow and shall conform to Section 150 of the Standard Specifications. Backfill material used in PM block walls shall also meet the quality of material and gradation requirements of the PM block manufacturer. Additional backfill requirements:

A. Soundness: The material shall be substantially free of shale or other soft, poor durability particles. The materials shall have a magnesium sulfate soundness loss, as determined by AASHTO T104 (ASTM C88), of less than 30 percent after four cycles.

Limits of backfill included under this Item shall be from the back face of the blocks to a vertical plane 12 inches beyond the rear most edge of the PM block walls. See Plans for diagrammatic details of the payment limits.

Leveling Pad

The leveling pad shall be constructed of dense graded crushed stone which shall meet the gradation requirements in Section M2 for crushed stone for bridge foundations, or other foundation material as approved by the Engineer. Leveling pad shall have minimum dimensions and limits as shown on the Plans and be placed at the design elevation shown on the Plans within a 1/8-inch tolerance.

Moment Slab

Cast-in-place or precast cement concrete moment slabs, if required based on the retaining wall design prepared by the Contractor, shall be furnished and constructed in accordance with Standard Specification Subsection 901. Moment slabs shall be constructed of the following standard MassDOT cement concrete mixes:

Structural Component	Cement Concrete Mix
CF and CP Traffic Barriers	4000, ¾ IN, 585 HP
S3-TL4 Curb	5000, ¾ IN, 685 HP
Moment Slab (Cast-in-place), Coping and Light Standard Pedestal (not integral with traffic barrier or S3-TL4 curb)	4000, ¾ IN, 610
Coping and Light Standard Pedestal (If cast integral to traffic barrier)	4000, ¾ IN, 585 HP
Coping and Light Standard Pedestal (If cast integral to S3-TL4 Curb)	5000, ¾ IN, 685 HP

All steel reinforcing shall be epoxy coated and shall conform to the requirements of AASHTO M31 Grade 60.

Steel reinforcement manufacturer shall be listed on the MassDOT Qualified Construction Materials List (QCML).

ITEM 996.4 (Continued)

ACCEPTANCE OF MATERIALS

The Contractor shall furnish to the Engineer a Certificate of Compliance certifying that the above materials comply with the applicable Contract specifications. A copy of all test results performed by the Contractor necessary to assure contract compliance shall also be furnished to the Engineer. Acceptance will be based on the Certificate of Compliance, accompanying test reports, and visual inspection by the Engineer.

DESIGN REQUIREMENTS

The PM block gravity wall system shall be designed to provide a prefabricated modular block retaining wall system that acts as a gravity wall without the need for external reinforcing straps, grids, mesh, tiebacks, deadmen, etc. behind the wall system to provide external stability that would conflict with existing and proposed utilities and drainage structures, including future maintenance and repair of utilities. For this reason, MSE type wall systems will not be considered. Prefabricated modular block gravity wall systems that provide stability within the wall envelope limits as shown on the Plans are permitted.

Design Specifications

The PM block retaining walls shall be designed to provide the grade separation shown on the Plans with a service life of not less than 75 years.

All calculations and Shop Drawings shall be signed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and experienced in prefabricated modular block retaining wall design and construction.

The PM block gravity wall system shall be designed in accordance with:

1. The manufacturer's requirements.
2. The Contract Plans.
3. The requirements as specified herein.
4. AASHTO LRFD Bridge Design Specification, current edition. Herein referenced as AASHTO LRFD.
5. AASHTO LRFD Bridge Construction Specifications, current edition.

Where conflicting requirements occur, the more stringent shall govern. Design shall consider Service, Strength, and Extreme Limit- States, and external and internal stability.

If stated on the Contract Drawings, the wall shall be designed for seismic forces according to the AASHTO Guide Specifications for LRFD Seismic Bridge Design, 2nd Edition, 2011 through 2022 interim updates.

The PM block wall shall be dimensioned so that the maximum bearing pressure does not exceed the factored bearing resistance of the foundation soils, as noted on the Plans. The factored bearing pressure stated assumes a uniform pressure distribution.

ITEM 996.4 (Continued)

The PM block walls shall be designed to account for drainage required for walls below established groundwater levels and seasonal levels.

The prefabricated block retaining wall design shall follow the general dimensions of the wall envelopes shown on the Plans. Top of leveling pad or footing elevations shall be as shown on the Plans, or may be lower. All wall elements shall be within the right-of-way limits shown on the Plans. The PM block wall units shall be placed so as not to interfere with guardrail posts, drainage or other utilities, or other potential obstructions.

All appurtenances behind, in front of, over (such as moment slab and coping), under, mounted upon or passing through the wall (such as drainage structures), or other appurtenances shown on the Plans shall be accounted for in the stability design of the prefabricated block retaining wall system.

The PM block retaining wall system shall be supported on cast-in-place unreinforced concrete leveling pad, or other foundation materials as approved by the Engineer. The top of the leveling pad shall be located at or below the theoretical leveling pad elevation. The minimum wall embedment shall be 4.0 feet as measured to the top of the leveling pad, or as shown on the Plans, whichever is greater. The leveling pads are incidental to this Item.

If steps at the bottom of the wall are required, they shall be kept at or below the footing elevation shown on the Contract Drawings. Steps in addition to those shown on the Contract Drawings will be permitted at no additional cost to the Department.

If additional soils information is required by the Contractor's wall designer, it must be obtained by the Contractor and will not be reimbursed by the Department.

Required geometry and reinforcing of moment slabs if needed has been provided on the Plans and the Geotechnical Report (Document A00834 included herein). Final design of copings and detailing of all components shall be completed by the Manufacturer, in accordance with the following standards:

1) 2025 Massachusetts Department of Transportation Bridge Manual, or latest edition.
2) NCHRP Report 663: Design of Roadside Barrier Systems Placed on MSE Retaining Walls
3) NCHRP Web Only Document 326: Design Guidelines for Test Level 3 through Test Level 5 Roadside Barrier Systems Placed on Mechanically Stabilized Earth Retaining Walls
4) 2024 American Association of State Highway and Transportation Officials LRFD Bridge Design Specifications, or latest edition.
5) American Association of State Highway and Transportation Officials Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, or latest edition."

Prior to manufacture of PM block wall units, the Contractor shall provide samples and mock-ups of the facing modular wall units for color and finish. The color of the wall mock-up shall be concrete gray and the wall surface shall have the "Ashlar" form finish. The first sample submittal shall consist of a minimum of two 12-inch x 12-inch x 2-inch samples indicating the range of expected variations in the color of concrete and specified finish.

ITEM 996.4 (Continued)

Upon selection of the desired color by the Engineer a second sample submittal shall be made. The second sample submittal shall consist of a minimum of two mock-up facing wall units, 5 feet x 5 feet in size, indicating the desired color with the desired finish. Upon approval of the second sample submittal, the approved mock-up PM wall units shall be available at the casting plant and the Engineer's office to establish acceptance criteria for the approved finished surface and color of the PM wall units. All sample submittals must be accepted by the Engineer for the visual qualities prior to proceeding with the next submittal or casting of the PM wall units.

The mock-up PM wall units shall be maintained and protected throughout the work of this Item to serve as criteria for acceptance of this work.

Mock-up will be viewed and approved by MassDOT representative.

PRE-CONSTRUCTION SUBMITTALS

Design computations demonstrating compliance with the criteria specified herein and shown on the Plans shall be prepared, signed, and stamped by a registered professional engineer licensed in the Commonwealth of Massachusetts and with a minimum of 5 years of experience in the design and construction of prefabricated retaining walls.

A. The design calculations shall include:

1. Statement of all assumptions made, and copies of all references used in the calculations. Calculations shall be performed in English units.

2. Analyses demonstrating compliance with all applicable earth, water, surcharges, seismic, or other applicable loads, as specified herein and required by the reference AASHTO LRFD. The design calculations shall include all applicable references to the LRFD code.

3. Analyses or studies demonstrating durability and corrosion resistance of the prefabricated retaining wall system for the proposed location and environment. The Contractor/Designers shall provide all corrosion protection devices necessary for the retaining wall to have a minimum service life of 75 years in the proposed location and environment.

4. Analyses demonstrating adequacy of design for external stability of the PM block wall system. Sliding, overturning, and bearing pressures shall be evaluated for conformance with stipulated design requirements.

5. Structural design of the final detailing of moment slab, if required, based on the manufacturer's product requirements and coordinated with the geometry and detailing required on Plans.

ITEM 996.4 (Continued)

B. A detailed resume of the wall designer shall be provided, listing similar projects and demonstrating necessary experience to perform the retaining wall designs, including a brief description of each project that is similar in scope shall be provided for acceptance. A reference shall be included for each project listed. As a minimum, the reference shall include an individual's name, address, and current phone number.

C. A detailed listing of the relevant type of PM block retaining walls that the Contractor has constructed shall be provided, including a brief description of each project and a listing of personnel who will construct the walls demonstrating their experience in construction of PM retaining walls. A reference shall be included for each project listed. As a minimum, the reference shall include an individual's name, address, and current phone number.

D. Manufacturer's product data for the PM block retaining wall system shall be provided, including material, manufacture and erection specifications, all specified erection equipment, details of buried wall elements, structures design properties, type of backfill, and details for connections between wall units.

E. Concrete mix design shall be in accordance with Section M4 of the Standard Specifications.

F. Provide Shop Drawings showing the configuration and all details, dimensions, quantities, and cross-sections necessary to construct the prefabricated block retaining walls, including but not limited to the following:

1. A plan view of the wall, which shall include Contract limits, stations and offsets, and the face of wall line as shown on the Plans.

2. An elevation view of the wall, which shall include the elevation at the top of the wall at all horizontal and vertical break points and at least every 25-feet along the face of the wall, all steps in the wall footings, the designation as to the type of retaining wall system, and an indication of the final ground line and maximum calculated bearing pressures. The theoretical face of wall as shown on the Plans shall be indicated.

3. A typical cross section or cross sections showing the elevation relationship between existing ground conditions and proposed grades, and the proposed wall configuration. The sections shall also indicate the location of the theoretical face of wall as shown on the Plans.

4. General notes pertaining to design criteria and wall construction.

5. A listing of the summary of material quantities for each wall.

6. Details of sleeves and pipes and other embedded items to be installed through the walls, if applicable. Annular space around the pipe shall be filled and sealed with closed cell foam.

7. Clearly indicate details for construction of walls or reinforcing elements around drainage, foundations, utilities or any other potential obstructions, where applicable.

ITEM 996.4 (Continued)

8. Details of the finished surface treatment for the face of PM block wall units.

9. Drainage design detail and design scheme, where applicable.

10. Location of utilities, where applicable.

11. Sequence and schedule of construction, including overall construction schedule.

12. Methods of excavation and backfill.

13. Method of maintaining stability of excavated trenches, where applicable.

14. Method of monitoring plumbness and deviation of wall.

15. Any acceptance testing and frequency.

16. Details and location of all necessary construction and expansion joints.

17. Details of impermeable membrane connection to PM wall units and to runoff collection system.

18. Details of maintaining stability, rigidity and alignment of the wall during construction, prior to wall construction completion, and prior to backfilling behind the top of the wall and roadway/moment slab construction at the top of the wall.

19. Groundwater elevation.

20. Layout and detail drawings for moment slab.

CONSTRUCTION METHODS – PLANT FABRICATION

Fabrication of the precast concrete wall elements shall conform to Section M4 Cement Concrete and Related Materials with the following additions.

All provided walls shall be from one single manufacturer. The same PM block wall system shall be used for all prefabricated modular block retaining walls on this project.

The date of manufacture, production lot number, and the piece mark shall be clearly scribed on an unexposed face of each PM wall unit.

PM Block Wall Unit Fabrication Tolerances

Dimension tolerances for precast modular block units shall be ½ inch or the manufacturer's published tolerances, whichever is less. Units not meeting the specified tolerances will be rejected.

ITEM 996.4 (Continued)

Architectural Form Liners

Exposed PM wall unit face shall be cast using custom architectural form liners. The unit face rustication shall be Ashlar Stone surface.

Form liners shall be manufactured by one of the following form liner manufacturers, or other manufacturers as approved by MassDOT:

1. Greenstreak Form Liners, by Greenstreak, St. Louis, Missouri.
2. Symons Form Liner, by Symons Corp., Des Plaines, Illinois.
3. Lithotex Formliner, by L.M. Scofield Co., Los Angeles, California.
4. Custom Rock Form Liners, by Custom Rock, St. Paul, Minnesota.

Lifting Devices and Threaded Inserts

Lifting sleeves and inserts shall be provided for the purpose of handling and placing. Care shall be taken during storage, transporting, hoisting, and handling to prevent cracking or damaging the precast units.

Repairs and replacement of PM wall units shall be in accordance with all relevant subsections of Section M4 Cement Concrete and Related Materials. Variations in the exposed face that substantially deviate from the approved architectural model unit as to color, texture, and reveal will be considered a Category 3 Rejectable Defect.

Storage and Shipping

The precast units shall be stored, shipped, and installed as specified in Section M4 Cement Concrete and Related Materials.

CONSTRUCTION METHODS

Prefabricated modular block gravity retaining walls shall be built in accordance with the Plans and accepted Shop Drawings for the proposed wall system.

The PM block retaining walls shall be constructed in accordance with these specifications and in reasonably close conformance with the lines, grades, design criteria, and dimensions shown on the Plans or as established by the Engineer. The Contractor is responsible for coordination with installation of guardrail and sidewalks.

The Contractor shall be responsible for the purchase or manufacture of the concrete modular block wall units of the PM block walls, plus all other necessary components, aggregate backfills, joint fillers, geotextile fabric, bearing pads, and membranes for a complete installation.

ITEM 996.4 (Continued)

Wall Penetrations

Utility penetrations through the PM block wall system shall be considered incidental to this Item. See Plans for details of pipe sleeves and stipulated requirements for coordination with the utility owner.

Delivery, Storage, and Handing

The Contractor shall check the material upon delivery to assure that the proper material has been

received. A product certification should be provided with each shipment.

All wall materials and PM block wall units shall be stored elevated from the ground and protected to prevent all mud, wet cement, epoxy and like substances, which may affix themselves to the PM block wall units. For storage exceeding 30 days in duration, all materials shall be stored in or beneath a trailer or covered with a colored tarpaulin to prevent long-term exposure.

Wall Excavation

Earth excavations shall be in accordance with the requirements of Subsection 120 and in close conformity to the limits shown on the Plans. Sections 120.80, 120.81, and 120.82 do not apply to the work covered in this section. Excavation to complete the excavation for prefabricated retaining walls shall be paid under Item 141. Class A Trench Excavation.

Foundation Preparation

The foundation for prefabricated block retaining walls shall be graded level for a width equal to the width/depth of each course of wall unit plus 1-foot. Prior to wall construction, the foundation shall be compacted with at least 10 passes of an appropriate roller, weighing a minimum of 10,000 lbs. Compact the foundation area to provide a hard and level surface to support wall units. Any foundation soils found to be unsuitable shall be removed as per Subsection 140 and replaced with Gravel Borrow for Bridge Foundation m1.03.0(a) as per Subsection 150. The foundation for the structure shall be approved by the Engineer before erection is started.

In areas below the existing groundwater level, backfill shall consist of Crushed Stone for Bridge Foundations as per Subsection 150.

Wall Erection

The precast modular block wall units shall be installed in accordance with approved manufacturer's recommendations. Special care shall be taken in setting the bottom course of units to true line and grade. While erecting each subsequent course, line and grade shall be examined and deviations shall be corrected to prevent accumulative inaccuracies in alignment. Joint filler and rubber pads shall be installed. Joints at corners or angle points shall be closed.

ITEM 996.4 (Continued)

All wall units above the first course shall interlock with the lower courses. Vertical joints shall be staggered with each successive course or as approved on the Shop Drawings. The maximum offset in any unit horizontal joint shall be ¼ inch.

The overall tolerance of the wall (top to bottom) shall not exceed ¾ inch per 10 feet in vertical alignment and horizontal alignment.

Backfill Placement

Backfill placement for PM block walls shall follow erection of each course of modular wall units. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the modular wall units. Any wall materials, which become damaged or disturbed during backfill placement, shall be removed and replaced at the Contractor's expense. Any misalignment or distortion of the modular units due to placement of backfill outside specified limits shall be corrected.

Compaction of backfill material shall adhere to the following criteria unless approved otherwise on the Shop Drawings:

A. Backfill material conforming to the requirements specified herein shall be placed and compacted simultaneously with the placement of the modular units.

B. Backfill lift shall be a maximum of 12 inches, uniform in thickness and compacted within the limits shown on the Plans. The Contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

C. Placement and compaction shall be accomplished without distortion or displacement of the modular units.

D. Backfill placement shall closely follow the erection of each row of PM block units.

E. The compaction shall take place in a direction that is parallel to the wall.

F. The specified compaction of the backfill material shall be accomplished by use of large, smooth drum, vibratory rollers with the exception of the 5-foot zone directly behind the wall face of the modular units.

G. Backfill shall be compacted to 95 percent of the maximum density as determined by AASHTO T 99, Method C or D (with oversize corrections as outlined in Note 7 of that test).

H. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have a placement moisture content less than or equal to the optimum moisture content. Backfill material with a placement moisture content in excess of the optimum moisture content shall be removed and reworked until the moisture content is uniformly acceptable throughout the entire lift.

ITEM 996.4 (Continued)

I. Within 5 feet of the wall face, small, single or double drum, hand operated, walk-behind vibratory rollers, or walk-behind vibrating plate compactors shall be used, and at least three passes shall be made.

J. When there is evidence of wall displacement or disturbance, compaction shall be accomplished by use of a smooth drum static roller.

K. At the end of each day's operation, the Contractor shall slope the last placed level of backfill away from the wall face to rapidly direct runoff of rainwater from the wall face.

The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

METHOD OF MEASUREMENT

Item 996.4 will be measured for payment by the SQUARE FOOT of prefabricated modular block gravity retaining wall installed, complete in place. The vertical area of retaining wall structure is defined as the area, measured at the wall face, bounded by the top of leveling pad or footing directly under the wall, ends of wall, and top of wall.

BASIS OF PAYMENT

Item 996.4 will be paid for at the Contract unit price per SQUARE YARD, which price shall include design, fabrication, transportation, erection, and installation of prefabricated retaining wall, including backfill and miscellaneous items required for a complete installation, all labor, tools, equipment, materials, and all incidental costs required to complete the work.

The unit price for Prefabricated Modular Block Gravity Retaining Wall shall include costs for:

A. All design work, preparation of written submittals and detailed construction drawings, revision of submittals, sample submittals and any other necessary preliminary work prior to and after acceptance of the retaining wall system by the Engineer.

B. All materials, including transportation, for the PM block retaining walls. For PM block walls this, includes concrete modular units, bearing blocks and shims, joint materials, cement concrete, reinforcing steel, aggregate backfill, anti-graffiti coating, and incidentals.

C. All labor and equipment required to prepare the wall foundation; erect the retaining walls to the lines and grades shown on the Plans; install the joint materials; install wall drainage; provide and install steel pipe sleeves for utility penetrations; provide, place, and compact backfill within wall units or backfill behind the wall units; and design, detail and construct any other items necessary to complete the prefabricated retaining walls.

D. As required and approved by the Engineer, excavation and replacement of any unsuitable materials beyond the retaining wall payment limits shown on the Plans will be measured and paid for as defined in Subsection 120 and Items 151.

ITEM 996.4 (Continued)

E. PM Wall Representative shall be incidental to this line Item.

F. Moment slabs, if needed, from the design shall be considered incidental to this Item.

G. Excavation to complete the prefabricated retaining walls shall be paid under Item 141. Class A Trench Excavation.

H. The 72-inch chain link fence shall be paid for separately under Item 645.172, 652.072, and 653.072.

END OF DOCUMENT

DOCUMENT A00802

DETAIL SHEETS

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PRELIMINARY ESTIMATE OF QUANTITIES – DETAIL SHEET

CITY/TOWN: Provincetown **YEAR: 2026**
STATION: STA 38+54 – STA 204+10 **ROAD:** Shank Painter Road
STA 70+75 – STA 517+75 **ROAD:** Route 6

TYPE OF PROJECT: HIGHWAY – CONSTRUCTION

Excavation					
Unclassified Excavation	16,018	CY	Class "A" Trench Excavation	2,170	CY
Class “B” Trench Excavation	160	CY	Class “B” Rock Excavation	70	CY

PAVEMENT NOTES

PROPOSED FULL DEPTH PAVEMENT: AREA=14,315 SY

PAVEMENT: 1.75" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER ASPHALT EMULSION FOR TACK COAT RS1-H OVER
1.75” SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC–12.5) OVER ASPHALT EMULSION FOR TACK COAT RS1-H OVER

BASE: 3.5” SUPERPAVE BASE COURSE 37.5 – (SBC–37.5)

SUBBASE: 4” DENSE GRADED CRUSHED STONE OVER EXISTING SUBBASE MEETING MATERIAL SPECIFICATIONS M1.03.0
GRAVEL BORROW, TYPE B OR 8” GRAVEL BORROW, TYPE B

PROPOSED RESURFACING STANDARD MILLING AND OVERLAY: AREA = 19,216 SY

SURFACE: 1.75” – VARIABLE DEPTH SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER ASPHALT EMULSION FOR TACK COAT RS1-H @ 0.08 GAL/SY OVER

LEVELING: VARIABLE DEPTH (<2.75” USE SLC 12.5; >2.75” USE VARIABLE DEPTH SLC 9.5 OVER VARIABLE DEPTH SLC 12.5)

PAVEMENT MICROMILL: 0.5”–1.75” VARIABLE DEPTH PAVEMENT STANDARD MILLING

PROPOSED CEMENT CONCRETE SIDEWALK/ PEDESTRIAN CURB RAMP: AREA = 2,411 SY

SURFACE: 4” CEMENT CONCRETE OVER

SUBBASE: 8” GRAVEL BORROW, TYPE B

PROPOSED CEMENT CONCRETE DRIVEWAY: AREA = 1,253 SY

SURFACE: 6" CEMENT CONCRETE BASE: 8"

GRAVEL BORROW, TYPE B

PROPOSED CEMENT CONCRETE TRUCK APRON: AREA = 427 SY

SURFACE: 8" STAMPED COLORED CONCRETE 4000 PSI, 0.75" 610, AIRE ENTRAINED WITH PENETRANT SEALER

BASE: 8" GRAVEL BORROW, TYPE B

PROPOSED HMA SIDEWALK & DRIVEWAY AREA = 2,205 SY

SIDEWALK

TOP COURSE: 1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC–9.2)
OVER 2.5" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5)

DRIVEWAY

TOP COURSE: 1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC–9.5) OVER 2.5" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5)

BASE: 8" GRAVEL BORROW, TYPE B

PROPOSED BRICK/MISC WALK AND DRIVEWAY: AREA = 41 SY

TOP COURSE: 4" BRICK/ FLAGSTONE PAVERS

BASE: 4" STONEDUST SETTING BED

PROPOSED FULL DEPTH RECONSTRUCTION BOX WIDENING AREA = 3,614 SY

PAVEMENT: 1.75" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER ASPHALT EMULSION FOR TACK COAT RS–1H OVER
1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC–12.5) OVER ASPHALT EMULSION FOR TACK COAT RS–1H OVER

BASE: 6" HIGH EARLY STRENGTH CEMENT CONRETE BASE COURSE

SUBBASE: 8" GRAVEL BORROW, TYPE B

PROPOSED HOT MIX ASPHALT PAVEMENT MILLING & OVERLAY FOR ROADWAY, PEDESTRIAN, AND BIKE LANE AREA = 2,205 SY

SURFACE 1.75" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) OVER ASPHALT EMULSION FOR TACK COAT RS–1H @ 0.08 GAL/SY OVER

LEVELING VARIABLE DEPTH (1" MAX) SUPERPAVE LEVELING COURSE – 12.5 (SLC 12.5) DIRECTED BY THE ENGINEER OVER

MILLING: VARIABLE DEPTH (0.5" TO 1.75") PAVEMENT MILLING

ITEM 101. CLEARING AND GRUBBING

Baseline	STA	TO	STA	SIDE
Route 6 Combine	103.+42		103.+42	RT
Route 6 Combine	107+92		107+92	RT
Route 6 Combine	110+00		110+00	RT
Route 6 (EB)	500+70		500+70	LT
Route 6 (EB)	501+72		501+72	RT
Shank Painter	12+56		12+56	RT
Shank Painter	23+80		23+80	LT
Shank Painter	26+21		26+21	LT
Shank Painter	28+25		28+25	LT
S		3		3
hank Painter	3+20		3+20	T
Shank Painter	34+15		34+15	RT

ITEM 102.2 TREE TRIMMING

Lump sum for utility pole relocations.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING

STREET	STA	SIDE	STREET	STA	SIDE
Shank Painter Rd	14+89	RT	Shank Painter Rd	32+12	LT
Shank Painter Rd	17+51	RT	Shank Painter Rd	32+37	RT
Shank Painter Rd	24+17	RT	Shank Painter Rd	32+39	RT
Shank Painter Rd	24+56	RT	Shank Painter Rd	32+76	RT
Shank Painter Rd	27+11	RT	Shank Painter Rd	33+33	RT
Shank Painter Rd	27+36	LT	Shank Painter Rd	33+68	RT
Shank Painter Rd	28+13	LT	Shank Painter Rd	35+27	RT
Shank Painter Rd	29+90	RT	Shank Painter Rd	35+49	RT
Shank Painter Rd	31+87	LT	Shank Painter Rd	36+16	RT

ITEM 102.521 TREE AND PLANT PROTECTION FENCE

STREET	STA	SIDE	STREET	STA	SIDE
Shank Painter Rd	13+35	LT	Shank Painter Rd	24+19	RT
Shank Painter Rd	14+89	RT	Shank Painter Rd	24+56	RT
Shank Painter Rd	16+00	LT	Shank Painter Rd	27+11	RT
Shank Painter Rd	16+00	RT	Shank Painter Rd	27+36	LT
Shank Painter Rd	16+12	LT	Shank Painter Rd	28+13	LT
Shank Painter Rd	16+26	LT	Shank Painter Rd	29+90	RT
Shank Painter Rd	16+40	LT	Shank Painter Rd	31+24	LT
Shank Painter Rd	16+45	RT	Shank Painter Rd	32+12	LT
Shank Painter Rd	16+76	RT	Shank Painter Rd	32+37	LT

ITEM 102.521 TREE AND PLANT PROTECTION FENCE (Continued)

Shank Painter Rd	17+51 RT	Shank Painter Rd	32+60 RT
Shank Painter Rd	23+82 RT	Shank Painter Rd	32+76 RT
Shank Painter Rd	32+93 LT	Shank Painter Rd	35+27 RT
Shank Painter Rd	33+33 RT	Shank Painter Rd	35+49 RT
Shank Painter Rd	33+68 RT	Shank Painter Rd	36+16 RT
Shank Painter Rd	34+95 LT		

ITEM 103. TREE REMOVED – DIAMETER UNDER 24 INCHES

STREET	TREE DIAMETER	STA	SIDE
Shank Painter Rd	12	20+15	RT
Shank Painter Rd	8	22+48	LT
Shank Painter Rd	12	23+56	RT
Shank Painter Rd	6	23+78	RT
Shank Painter Rd	5	24+78	RT
Shank Painter Rd	3	25+37	RT
Shank Painter Rd	3	25+46	RT
Shank Painter Rd	3	25+49	RT
Shank Painter Rd	3	25+57	RT
Shank Painter Rd	15	25+66	RT
Shank Painter Rd	6	25+93	RT
Shank Painter Rd	10	26+05	RT
Shank Painter Rd	10	26+21	RT
Shank Painter Rd	12	30+55	RT
Shank Painter Rd	10	33+68	LT
Shank Painter Rd	10	33+69	LT
Shank Painter Rd	18	36+52	RT

ITEM 104. TREE REMOVED – DIAMETER 24 INCHES AND OVER

STREET	TREE DIAMETER	STA	SIDE
Shank Painter Rd	24	33+95	LT
Shank Painter Rd	24	37+14	RT

ITEM 120.1 UNCLASSIFIED EXCAVATION

ITEM NO.	AREA (SF)	DEPTH (INCH)
From Earth Work Summary (Full Depth Only)	9686.72	
Roundabout Pavement	7464	19
Roundabout Truck Apron	3845	19
Roundabout Center Island	2131	19
Route 6 Combine (Full Depth Only)	6484	19
Route 6 Ped and Bike Path (FD Only)	2793	19
Route 6 FD Box Widening	32530	18

ITEM 146. DRAINAGE STRUCTURE REMOVED

STREET	STA	SIDE	STREET	STA	SIDE
Shank Painter Rd	18+31.08	LT	Shank Painter Rd	22+81.31	LT
Shank Painter Rd	18+39.97	LT	Shank Painter Rd	22+89.39	LT
Shank Painter Rd	18+47.62	LT	Shank Painter Rd	22+98.15	LT
Shank Painter Rd	18+53.16	LT	Shank Painter Rd	23+11.54	LT
Shank Painter Rd	18+53.76	RT	Shank Painter Rd	23+19.76	LT
Shank Painter Rd	18+65.96	LT	Shank Painter Rd	23+24.07	LT
Shank Painter Rd	18+75.18	LT	Shank Painter Rd	23+71.99	LT
Shank Painter Rd	19+32.96	LT	Shank Painter Rd	23+79.77	LT
Shank Painter Rd	20+29.49	RT	Shank Painter Rd	23+81.61	LT
Shank Painter Rd	20+37.16	RT	Shank Painter Rd	31+81.15	LT
Shank Painter Rd	20+45.60	RT	Shank Painter Rd	32+39.07	LT
Shank Painter Rd	20+58.04	RT	Shank Painter Rd	32+73.38	LT
Shank Painter Rd	20+59.81	LT	Shank Painter Rd	32+79.63	LT
Shank Painter Rd	20+62.51	LT	Route 6	72+50.47	RT
Shank Painter Rd	20+68.54	RT	Route 6	76+52.56	RT
Shank Painter Rd	20+69.50	LT	Route 6	81+51.99	RT
Shank Painter Rd	20+76.78	RT	Route 6	85+49.57	RT
Shank Painter Rd	20+84.96	RT	Route 6	92+74.89	RT
Shank Painter Rd	21+39.36	RT	Route 6	97+92.55	RT
Shank Painter Rd	21+47.39	RT	Route 6	102+92.11	RT
Shank Painter Rd	21+61.12	RT	Route 6	106+92.91	RT
Shank Painter Rd	21+61.35	RT	Route 6	109+56.30	RT
Shank Painter Rd	21+61.54	LT	Route 6 WB	200+68.99	RT
Shank Painter Rd	21+79.23	RT	Route 6 Bike/Ped	760+99.05	LT
Shank Painter Rd	21+87.06	RT	Route 6 Bike/Ped	761+02.04	RT
Shank Painter Rd	22+80.40	LT			

And as required by the Engineer

ITEM 156. CRUSHED STONE

For use as a bedding material for drainage pipes and structures where saturated soils are unstable, as bedding material for sewer pipes and structures, leaching basin

ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS

Item included as a Contingency.

ITEM 182.2 REMOVAL OF ASBESTOS

Item included as a Contingency.

Asbestos may potentially be encountered during removal of the existing water line.at Court Street

ITEM 201. CATCH BASIN

STREET/CB-ID	STA	OFFSET	SIDE
Route 6 / 008-CB	72+50.48’	14.00’	RT
Route 6 / 009-CB	76+52.61’	14.00’	RT
Route 6 / 010-CB	81+52.02’	14.00’	RT
Route 6 / 011-CB	85+49.62’	14.00’	RT
Route 6 / 012-CB	92+75.00’	14.00’	RT
Route 6 / 013-CB	97+92.65’	14.00’	RT
Route 6 / 014-CB	102+92.17’	14.00’	RT
Route 6 / 016-CB	106+92.96’	14.00’	RT
Route 6 / 017-CB	109+56.44’	14.00’	RT
Route 6 / 101-CBCI	111+84.60’	13.94’	LT
Route 6 / 102-CBCI	111+98.03’	13.94’	RT
Route 6 / 104-CB	113+39.03’	61.71’	LT
Route 6 EB / 111-CBCI	501+49.26’	9.16’	LT
Route 6 EB / 112-CBCI	501+50.10’	8.81’	RT
Route 6 WB / 114-CBCI	201+36.83’	8.15’	LT
Route 6 WB / 115-CBCI	201+34.52’	7.83’	RT
Shank Painter Rd / 119-CB	10+84.95’	27.41’	RT
Shank Painter Rd / 120-CB	10+83.46’	25.06’	LT
Shank Painter Rd / 122-CB	11+52.38’	23.69’	RT
Shank Painter Rd / 124-CB	11+52.75’	21.73’	LT
Shank Painter Rd / 127-CBCI	14+37.75'	15.86'	LT
Shank Painter Rd / 129-CBCI	14+37.24'	15.84'	RT
Shank Painter Rd / 130-CBCI	15+14.07'	15.89'	LT
Shank Painter Rd / 201-CB	18+52.44’	15.92’	LT
Shank Painter Rd / 202-CBCI	18+53.62’	15.93’	RT
Shank Painter Rd / 204-CBCI	21+23.34’	15.87’	LT
Shank Painter Rd / 206-CBCI	21+37.43’	16.00’	RT
Shank Painter Rd / 208-CBCI	22+92.27’	16.11’	RT
Shank Painter Rd / 209-CB	22+98.65’	15.86’	LT
Shank Painter Rd / 214-CB	24+78.93’	15.98’	LT
Shank Painter Rd / 215-CBCI	24+78.93’	15.97’	RT
Shank Painter Rd / 217-CBCI	25+30.56’	15.88’	RT
Shank Painter Rd / 218-CB	25+48.37’	15.86’	LT
Shank Painter Rd / 401-CBCI	28+02.58’	15.71’	RT
Shank Painter Rd / 402-CBCI	28+23.72’	15.93’	LT
Shank Painter Rd / 406-CBCI	29+89.33’	15.87’	RT
Shank Painter Rd / 408-CBCI	33+05.25’	15.86’	LT
Shank Painter Rd / 409-CBCI	33+01.56’	15.71’	RT
Shank Painter Rd / 411-CBCI	33+23.26’	15.93’	LT
Shank Painter Rd / 412-CBCI	33+22.26’	15.87’	RT
Shank Painter Rd / 419-CB	35+34.60’	34.03’	LT

ITEM 202. MANHOLE

STREET/DMH-ID	STA	OFFSET	SIDE
Route 6 / 015-DMH	113+44.29’	52.29’	LT
Route 6 / 016-DMH	104+74.00’	21.01’	LT
Route 6 EB / 106-DMH	500+60.66’	18.60’	LT
Route 6 EB / 109-DMH	501+22.55’	0.77’	LT
Route 6 EB / 110-DMH	501+38.07’	0.27’	LT
Route 6 WB / 113-DMH	302+26.02’	0.89’	LT
Route 6 EB / 117-DMH	500+83.12’	11.79’	LT
Route 6 EB / 118-DMH	500+85.37’	31.10’	RT
Shank Painter Rd / 121-DMH	10+84.30’	35.24’	LT
Shank Painter Rd / 123-DMH	11+44.39’	10.96’	LT
Shank Painter Rd / 126-DMH	12+36.59’	12.41’	LT
Shank Painter Rd / 128-DMH	14+36.59’	7.47’	LT
Shank Painter Rd / 205-DMH	21+33.94’	9.93’	RT
Shank Painter Rd / 207-DMH	22+81.99’	12.54’	RT
Shank Painter Rd / 210-DMH	22+98.12’	-5.92’	LT
Shank Painter Rd / 211-DMH	24+52.41’	12.8’	LT
Shank Painter Rd / 213-DMH	24+62+52'	7.28'	LT
Shank Painter Rd / 403-DMH	28+30.31’	20.97’	RT
Shank Painter Rd / 404-DMH	29+18.36’	20.98’	RT
Shank Painter Rd / 407-DMH	30+11.78’	22.12’	RT
Shank Painter Rd / 410-DMH	32+27.27’	23.65’	RT
Shank Painter Rd / 413-DMH	33+02.92’	23.20’	RT
Shank Painter Rd / 415-DMH	35+01.47’	27.04’	RT
Shank Painter Rd / 417-DMH	35+43.94	15.90’	LT
Shank Painter Rd / 420-DMH	35+55.32’	-21.49’	LT

ITEM 202.2 MANHOLE (9 TO 14 FOOT DEPTH)

STREET	STA	OFFSET	SIDE
Shank Painter Rd / 203-DMH	18+60.76	13.08’	RT
Shank Painter Rd / 215-DMH	25+23.09	14.42’	LT
Shank Painter Rd / 420-DMH	35+55.84	15.76’	LT

ITEM 203.1 STILLING BASIN

STREET	STA	SIDE
Shank Painter Rd	15+10	LT

ITEM 203.2 OVERFLOW STRUCTURE

STREET
Shank Painter Rd

ITEM 203.3 HYDRODRNAMIC SEPARATORS

STREET/NAME	STA
Shank Painter Rd / 414 HDS	34+89
Shank Painter Rd / 418 HDS	35+44

ITEM 204. GUTTER INLET

STREET/GI-ID	STA	OFFSET	SIDE
Shank Painter Rd / 405-GICI	30+09.02’	15.86’	LT
Shank Painter Rd / 421-GICI	35+58.78’	15.96’	RT
Shank Painter Rd / 422-GI	35+67.93’	16.01’	LT
Shank Painter Rd / 216-GICI	25+30.56’	15.88’	RT

ITEM 205. LEACHING BASIN

STREET/LB-ID	STA	OFFSET	SIDE
Shank Painter Rd / 103-A-LB	112+13.98'	25.92’	LT
Shank Painter Rd / 103-B-LB	112+26.09'	29.10’	LT
Shank Painter Rd / 103-C-LB	112+37.73'	31.72’	LT
Shank Painter Rd / 103-D-LB	112+48.46'	34.28’	LT

ITEM 205.5 INFILTRATION CHAMBERS

LOCATION
Parking Lot

ITEM 220. DRAINAGE STRUCTURE ADJUSTED

To adjust castings set at a temporary elevation for construction staging to the proposed, final rim elevation.

STREET	STA	SIDE	STREET	STA	SIDE
Shank Painter Rd	22+13.82	RT	Route 6 Bike/Ped Path	720+18.75	LT
Shank Painter Rd	29+67.69	RT	Route 6 Bike/Ped Path	724+16.04	LT
Shank Painter Rd	38+53.83	RT	Route 6 Bike/Ped Path	724+16.06	RT
Route 6	72+50.66	LT	Route 6 Bike/Ped Path	729+16.31	RT
Route 6	76+52.30	LT	Route 6 Bike/Ped Path	729+16.61	LT
Route 6	81+51.55	LT	Route 6 Bike/Ped Path	733+19.39	RT
Route 6	85+49.71	LT	Route 6 Bike/Ped Path	733+19.47	LT
Route 6	92+74.59	LT	Route 6 Bike/Ped Path	739+54.38	LT
Route 6	97+92.75	LT	Route 6 Bike/Ped Path	739+54.67	RT
Route 6	102+92.52	LT	Route 6 Bike/Ped Path	745+76.55	LT
Route 6	107+02.84	LT	Route 6 Bike/Ped Path	745+76.64	RT
Route 6	109+56.49	LT	Route 6 Bike/Ped Path	750+76.36	RT
Route 6 WB	203+99.96	RT	Route 6 Bike/Ped Path	750+76.50	LT
Route 6 WB	204+00.01	LT	Route 6 Bike/Ped Path	754+76.12	LT
Route 6 EB	504+05.54	RT	Route 6 Bike/Ped Path	754+75.56	RT
Route 6 EB	504+05.54	LT	Route 6 Bike/Ped Path	757+40.15	LT
Route 6 Bike/Ped Path	720+18.24	RT	Route 6 Bike/Ped Path	757+40.24	RT

ITEM 220. 2 DRAINAGE STRUCTURE REBUILT

As needed for rebuilding existing drainage structures as directed by the Engineer.

ITEM 220.3 DRAINAGE STRUCTURE CHANGE IN TYPE

Contingency as needed for change in type the structures as directed by the Engineer.

ITEM 220.5 DRAINAGE STRUCTURE REMODELED

Contingency as needed for remodeled drainage structures as directed by the Engineer.

ITEM 220.6 SANITARY STRUCTURE REBUILT

Contingency as needed for remodeled drainage structures as directed by the Engineer.

ITEM 220.7 SANITARY STRUCTURE ADJUSTED

STREET	STA	SIDE	STREET	STA	SIDE
Shank Painter Rd	14+82.68	LT	Shank Painter Rd	26+96.07	LT
Shank Painter Rd	14+97.43	LT	Shank Painter Rd	28+87.62	LT
Shank Painter Rd	15+26.67	RT	Shank Painter Rd	30+39.45	LT
Shank Painter Rd	18+21.76	LT	Shank Painter Rd	32+63.58	LT
Shank Painter Rd	19+71.09	LT	Shank Painter Rd	35+52.06	LT
Shank Painter Rd	19+85.19	LT	Shank Painter Rd	37+85.57	LT
Shank Painter Rd	22+71.83	LT	Shank Painter Rd	39+98.42	RT
Shank Painter Rd	22+81.00	RT	Route 6 EB	500+48.07	RT
Shank Painter Rd	23+45.31	RT	Route 6 EB	500+51.48	RT
Shank Painter Rd	25+06.26	LT			

ITEM 220.8 SANITARY STRUCTURE REMODELED

Contingency as directed by the Engineer.

ITEM 222.3 FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD

FOR ITEM 201. Catch Basin
ITEM 202. Manhole
ITEM 202.0 Manhole (9 to 14 Foot Depth)
ITEM 203.21 Stilling Basin
ITEM 203.3 Hydrodynamic Separator
ITEM 204. Gutter Inlet
ITEM 205. Leaching Basin

ITEM 223.1 FRAME AND GRATE (OR COVER) REMOVED AND STACKED

As directed by the Engineer.

ITEM 241.12 12 INCH REINFORCED CONCRETE PIPE CLASS III

STREET	STA	TO	STA	SIDE
Shank Painter Rd	35+43.94'		35+01.47'	LT/RT
Shank Painter Rd	35+58.78'		35+55.84'	LT/RT
Shank Painter Rd	28+23.72'		28+30.31'	LT/RT
Shank Painter Rd	28+02.58'		28+30.31'	RT
Shank Painter Rd	30+11.66'		30+11.78'	RT
Shank Painter Rd	30+09.02'		30+11.66'	LT/RT
Shank Painter Rd	33+02.80'		33+02.92'	RT
Shank Painter Rd	18+53.62'		18+60.76'	RT
Shank Painter Rd	22+98.65'		22+98.12'	LT
Shank Painter Rd	21+37.43'		21+33.94'	RT
Shank Painter Rd	21+23.34'		21+33.94'	LT/RT
Shank Painter Rd	25+48.37'		25+23.09'	LT
Shank Painter Rd	25+30.56'		25+23.09'	LT/RT
Shank Painter Rd	25+23.09'		24+78.93'	LT
Shank Painter Rd	18+52.44'		18+60.76'	LT/RT
Shank Painter Rd	24+78.77'		24+78.93'	LT/RT
Shank Painter Rd	22+92.27'		22+81.99'	RT
Shank Painter Rd	35+34.60'		35+44.35'	LT
Shank Painter Rd	35+67.93'		35+55.84'	LT
Shank Painter Rd	35+43.94'		35+44.35'	LT
Shank Painter Rd	18+60.76'		21+33.94'	RT
Shank Painter Rd	28+30.31'		29+18.36'	RT
Shank Painter Rd	29+18.36'		30+11.78'	RT
Shank Painter Rd	35+44.39'		35+44.47'	LT
Shank Painter Rd	35+55.84'		35+43.94'	LT
Shank Painter Rd	15+14.07'		15+12.40'	LT
Route 6 EB	501+22.55'		501+16.03'	LT
Shank Painter Rd	14+37.24'		14+36.59'	LT/RT
Shank Painter Rd	14+37.75'		14+36.59'	LT
Route 6	112+48.46'		112+37.73'	LT
Route 6	112+37.73'		112+26.09'	LT
Route 6	112+26.09'		112+13.98'	LT
Shank Painter Rd	11+52.38'		11+44.39'	LT/RT
Shank Painter Rd	11+52.75'		11+44.39'	LT
Shank Painter Rd	10+84.95'		10+83.46'	LT/RT
Shank Painter Rd	10+83.46'		10+84.30'	LT
Route 6	113+39.03'		113+44.29'	LT
Route 6 EB	501+20.55'		501+22.55'	LT/RT
Route 6	111+98.03'		112+13.98'	LT/RT
Route 6	111+84.60'		112+13.98'	LT
Route 6	112+48.46'		113+44.29'	LT
Route 6 WB	201+36.83'		201+26.02'	LT
Route 6 WB	201+34.52'		201+26.02'	LT

ITEM 241.12 12 INCH REINFORCED CONCRETE PIPE CLASS III (Continued)

STREET	STA	TO	STA	SIDE
Route 6 EB	501+49.26'		501+38.07'	LT
Route 6 EB	501+50.10'		501+38.07'	LT/RT
Shank Painter Rd	12+41.48'		12+36.53'	LT/RT
Route 6 EB	501+38.07'		501+22.55'	LT/RT
Route 6 EB	500+28.32'		500+60.66'	LT/RT
Route 6 EB	500+60.66'		500+64.92'	LT/RT

ITEM 241.15 15 INCH REINFORCED CONCRETE PIPE CLASS III

STREET	STA	TO	STA	SIDE
Route 6	102+95.52'		104+74.00'	LT
Route 6	104+74.00		106+92.98'	LT
Shank Painter Rd	30+11.78'		32+27.27'	RT
Shank Painter Rd	33+02.92'		34+89.40'	RT
Shank Painter Rd	32+27.27'		33+02.92'	RT
Shank Painter Rd	34+89.40'		35+01.47'	RT

ITEM 241.18 18 INCH REINFORCED CONCRETE PIPE CLASS III

STREET	STA	TO	STA	SIDE
Shank Painter Rd	24+78.93'		24+70.21'	LT
Shank Painter Rd	21+33.94'		22+81.99'	RT
Shank Painter Rd	14+36.59		12+36.53’	LT
Shank Painter Rd	12+36.53'		11+44.39'	LT
Shank Painter Rd	11+44.39'		10+84.30'	LT
Shank Painter Rd	10+84.30'		10+84.30'	LT
Shank Painter Rd	15+12.40'		14+36.59'	LT
Shank Painter Rd	35+01.47'		35+01.50'	RT

ITEM 241.24 24 INCH REINFORCED CONCRETE PIPE CLASS III

STREET	STA	TO	STA	SIDE
Shank Painter Rd	22+98.12'		24+70.21'	LT
Shank Painter Rd	22+81.99'		22+98.12'	RT
Shank Painter Rd	10+84.30’		10+84.30’	LT
Shank Painter Rd	500+85.37’		500+83.12’	LT/RT
Shank Painter Rd	24+70.21'		24+70.18'	LT
Route 6 (EB)	500+83.12’		500+82.00'	LT

ITEM 242.18 18 INCH REINFORCED CONCRETE PIPE FLARED END

STREET	STA	TO	STA	SIDE
Shank Painter Rd	35+00’		35+00’	RT

ITEM 244.12 12 INCH REINFORCED CONCRETE PIPE CLASS V

STREET	STA	TO	STA	SIDE
Shank Painter Rd	33+03.93’		33+02.80’	LT
Shank Painter Rd	32+27.22’		32+27.27’	RT
Shank Painter Rd	32+23.64’		32+27.22’	LT
Shank Painter Rd	25+30.56’	T	25+23.09’	RT
Shank Painter Rd	24+78.77’		24+78.93’	LT

ITEM 245.16 16 INCH POLYVINYL CHLORIDE C900 PIPE

STREET	STA	TO	STA	SIDE
Shank Painter Rd	15+16.25’		18+76.43’	LT/RT
Shank Painter Rd	21+48.48’		23+50.00’	RT
Shank Painter Rd	26+50.00’		24+86.31’	RT
Court St	5+24.06’		5+60.00’	LT
Shank Painter Rd	24+28.31’		25+03.16’	RT
Shank Painter Rd	18+76.43’		21+48.48’	RT

ITEM 258.1 STONE FOR DRAINAGE OUTLETS

STREET	STA	SIDE
Shank Painter Rd	15+24’	LT
Shank Painter Rd	35+02’	RT

ITEM 350.06 6 INCH GATE AND GATE BOX

For water gates that are unable to be adjusted or relocated, existing water gates that are broken, and locations identified on the plans.

ITEM 357.06 6 INCH GATE BOX

Contingency as directed by the Engineer.

ITEM 358. GATE BOX ADJUSTED

STREET	STA	SIDE	STREET	STA	SIDE
Jerome Smith Rd	5+67.49	RT	Shank Painter Rd	23+23.42	LT
Shank Painter Rd	14+40.53	LT	Shank Painter Rd	23+26.21	LT
Shank Painter Rd	14+45.30	LT	Shank Painter Rd	23+28.25	LT
Shank Painter Rd	14+46.55	LT	Shank Painter Rd	23+89.95	RT
Shank Painter Rd	15+63.15	LT	Shank Painter Rd	25+04.10	RT
Shank Painter Rd	16+24.12	LT	Shank Painter Rd	25+08.39	RT
Shank Painter Rd	16+30.14	LT	Shank Painter Rd	25+12.29	RT
Shank Painter Rd	18+52.54	LT	Shank Painter Rd	26+48.45	RT
Shank Painter Rd	18+54.79	LT	Shank Painter Rd	30+47.40	RT
Shank Painter Rd	18+57.79	LT	Shank Painter Rd	30+49.75	RT
Shank Painter Rd	18+62.23	LT	Shank Painter Rd	30+51.50	RT
Shank Painter Rd	18+70.57	RT	Shank Painter Rd	31+23.53	RT
Shank Painter Rd	19+39.71	LT	Shank Painter Rd	31+59.04	RT
Shank Painter Rd	19+44.52	LT	Shank Painter Rd	38+30.12	RT
Shank Painter Rd	19+70.59	LT			
Shank Painter Rd	19+72.85	LT			
Shank Painter Rd	19+75.46	LT			
Shank Painter Rd	20+49.88	LT			
Shank Painter Rd	20+53.41	LT			
Shank Painter Rd	20+58.01	LT			
Shank Painter Rd	20+62.40	LT			

And as required by the Engineer.

ITEM 376.5 HYDRANT - ADJUSTED

STREET	STA	SIDE
Shank Painter Rd	15+63.21	LT
Shank Painter Rd	18+62.26	LT
Shank Painter Rd	18+69.34	RT
Shank Painter Rd	23+88.68	RT
Shank Painter Rd	31+59.16	RT

ITEM 381 SERVICE BOX

As needed to relocate existing service boxes within the proposed roadway widenings.

ITEM 381.3 SERVICE BOX ADJUSTED

STREET	STA	SIDE
Jerome Smith Rd	5+58.45	RT
Jerome Smith Rd	5+59.80	RT
Jerome Smith Rd	5+61.79	RT
Shank Painter Rd	13+81.76	RT
Shank Painter Rd	16+26.29	RT
Shank Painter Rd	17+03.93	LT
Shank Painter Rd	17+80.24	LT
Shank Painter Rd	17+84.60	LT
Shank Painter Rd	18+65.96	LT
Shank Painter Rd	20+05.64	RT
Shank Painter Rd	21+66.89	RT
Shank Painter Rd	26+43.24	RT
Shank Painter Rd	26+98.28	RT
Shank Painter Rd	27+72.68	RT
Shank Painter Rd	31+21.49	RT
Shank Painter Rd	31+36.68	RT
Shank Painter Rd	31+49.14	LT
Shank Painter Rd	31+53.05	LT
Shank Painter Rd	32+02.22	RT
Shank Painter Rd	35+31.68	RT
Shank Painter Rd	35+40.52	LT
Shank Painter Rd	36+02.35	RT
Shank Painter Rd	36+68.38	RT
Shank Painter Rd	36+72.27	LT
Shank Painter Rd	37+02.25	RT
Shank Painter Rd	37+05.01	LT

ITEM 451. HMA FOR PATCHING

For permanent pavement patching and for the intermediate course in milling and overlay areas where existing pavement is in poor condition as directed by the Engineer.

For permanent pavement patching for utility installation within the mill and overlay area.

ITEM 452. ASPHALT EMULSION FOR TACK COAT

STREET	STA	TO	STA
Route 6 Combine	70+75	TO	113+15
Route 6 Bike/Ped	718+45	TO	761+00
Route 6 EB	500+42	TO	504+25
Route 6 WB	200+34	TO	204+10
Shank Painter Rd	10+40	TO	38+64

ITEM 470.2 HOT MIX ASPHALT BERM, TYPE A MODIFIED

STREET	STA	TO	STA	SIDE
Route 6 Combine	70+75		101+45	LT
Route 6 Combine	102+32		112+61	LT
Route 6 Combine	70+75		93+55	RT
Route 6 Combine	94+33		103+25	RT
Route 6 Combine	103+97		110+90	RT
Route 6 Combine	109+00		110+05	RT
Route 6 Combine	110+86		112+60	RT
Route 6 Bike/Ped Path	718+45		741+59	LT
Route 6 Bike/Ped Path	718+45		741+69	RT
Route 6 Bike/Ped Path	741+89		751+28	LT
Route 6 Bike/Ped Path	741+89		751+28	RT
Route 6 Bike/Ped Path	751+62		755+88	LT
Route 6 Bike/Ped Path	751+62		755+88	RT
Route 6 Bike/Ped Path	756+23		758+09	LT
Route 6 Bike/Ped Path	758+23		758+09	RT
Route 6 Bike/Ped Path	758+38		760+59	LT
Route 6 Bike/Ped Path	758+38		761+10	RT
Route 6 WB	201+28		204+10	LT
Route 6 WB	201+28		201+60	RT
Route 6 WB	201+75		202+33	RT
Route 6 WB	202+44		204+10	RT
Captain Berties' Way	5+00		6+09	RT
Shank Painter Rd	23+46		24+93	RT (Parking Lot)
Shank Painter Rd	25+16		26+36	RT (Parking Lot)
Court Street	5+30		5+50	LT
Court Street	5+38		5+50	RT

ITEM 472. TEMPORARY ASPHALT PATCHING

For Temporary patching for drainage, sewer and water main work
For Temporary asphalt around raised structures
For Temporary asphalt ramps and driveway
For temporary sidewalk
For curb setting with Full Depth Reconstruction limits

ITEM 477. MILLED RUMBLE STRIP (TYPE A)

Route 6 Sta. 70+75 to Sta. 111+92

ITEM 503. GRANITE CURB TYPE VA3 – STRAIGHT

STREET	STA	TO	STA	SIDE
Shank Painter Road	31+52		31+63	RT
Shank Painter Road	31+69		31+81	RT
Shank Painter Road	32+19		33+96	RT

ITEM 506. GRANITE CURB TYPE VB – STRAIGHT

STREET	STA	TO	STA	SIDE
Shank Painter Road	11+07		11+28	RT
Shank Painter Road	11+11		11+25	RT
Shank Painter Road	11+61		13+19	RT
Jerome Smith Road	5+27		5+45	RT
Jerome Smith Road	5+22		5+25	RT
Jerome Smith Road	5+22		5+25	RT
Jerome Smith Road	5+25		5+25	RT
Jerome Smith Road	5+32		5+32	RT
Jerome Smith Road	5+34		5+44	RT
Jerome Smith Road	5+92		6+20	LT
Shank Painter Road	12+64		12+77	LT
Shank Painter Road	13+34		14+14	LT
Shank Painter Road	13+80		14+14	RT
Shank Painter Road	14+35		14+43	RT
Shank Painter Road	14+35		15+17	RT
Captain Bertie’s Way	5+51		6+08	LT
Shank Painter Road	15+05		15+55	LT
Shank Painter Road	15+71		16+02	RT
Shank Painter Road	16+01		16+66	LT
Shank Painter Road	16+44		17+56	RT
Shank Painter Road	17+83		18+07	LT
Shank Painter Road	18+23		18+71	RT
Shank Painter Road	18+68		18+75	LT
Shank Painter Road	18+88		18+99	LT
Shank Painter Road	18+91		19+38	RT
Shank Painter Road	19+43		19+85	LT
Shank Painter Road	19+83		20+50	RT
Shank Painter Road	20+19		20+21	LT
Shank Painter Road	21+15		21+40	RT
Shank Painter Road	21+20		21+26	LT
Shank Painter Road	21+56		21+65	LT
Shank Painter Road	22+23		22+99	RT
Shank Painter Road	22+63		21+74	LT
Shank Painter Road	23+47		24+79	LT
Shank Painter Road	23+55		24+80	RT
Shank Painter Road	25+24		25+39	RT
Shank Painter Road	25+41		25+43	LT

ITEM 506. **GRANITE CURB TYPE VB – STRAIGHT** (Continued)

STREET	STA	TO	STA	SIDE
Shank Painter Road	25+59		26+25	RT
Shank Painter Road	25+60		30+14	LT
Shank Painter Road	27+07		27+39	RT
Shank Painter Road	27+72		28+04	RT
Browne Street	9+40		9+64	LT
Browne Street	9+63		9+64	RT
Browne Street	9+68		9+72	RT
Browne Street	10+28		10+70	LT
Browne Street	10+35		10+70	RT
Shank Painter Road	29+82		29+91	LT
Shank Painter Road	30+59		30+82	LT
Shank Painter Road	30+72		30+78	RT
Shank Painter Road	30+86		31+26	RT
Shank Painter Road	31+59		31+74	RT
Shank Painter Road	31+82		32+25	LT
Shank Painter Road	32+23		32+29	LT
Shank Painter Road	32+41		32+43	LT
Shank Painter Road	32+44		33+89	RT
Shank Painter Road	32+90		34+57	LT
Shank Painter Road	34+33		36+79	RT
Shank Painter Road	34+83		34+86	LT
Shank Painter Road	35+67		35+76	LT
Shank Painter Road	37+17		37+18	LT
Shank Painter Road	37+15		37+20	RT
Shank Painter Road	37+88		38+36	RT
Bradford Street	108+68		108+80	RT
Bradford Street	109+42		109+57	LT
Shank Painter Road	10+68		10+89	RT
Shank Painter Road	10+71		10+89	LT
Shank Painter Road	10+89		10+89	RT/LT
Shank Painter Road	10+99		10+99	RT/LT
Shank Painter Road	10+99		11+14	RT
Shank Painter Road	10+99		11+14	LT
Route 6	112+44		112+65	RT
Route 6	112+46		112+65	LT
Route 6	112+65		112+65	LT/RT
Route 6	112+71		112+71	LT/RT
Route 6	112+71		112+84	LT
Route 6	112+71		112+87	RT
Route 6	112+65		113+12	LT
Route 6	112+66		112+95	RT
Route 6 East	500+60		501+36	LT
Route 6 East	500+74		501+36	RT
Route 6 West	200+48		201+21	LT
Route 6 West	200+75		201+21	RT

ITEM 506.1 GRANITE CURB TYPE VB – CURVED

STREET	STA	TO	STA	SIDE	
Shank Painter Road	11+25		11+37	LT	
Shank Painter Road	11+55		11+59	LT	
Shank Painter Road	12+42		12+64	RT	
Shank Painter Road	14+43		14+47	LT	
Captain Bertie's Way	5+22		5+22	LT/RT	
Captain Bertie's Way	5+32		5+45	RT	
Captain Bertie's Way	5+33		5+45	LT/RT	
Captain Bertie's Way	5+45		5+45	LT	
Captain Bertie's Way	5+50		5+92	LT	
Shank Painter Road	15+01		15+05	LT	
Shank Painter Road	17+56		17+59	RT	
Shank Painter Road	17+76		17+76	RT	
Shank Painter Road	18+04		18+06	RT	
Shank Painter Road	18+19		18+23	RT	
Shank Painter Road	24+93		25+93	RT	
Court Street	5+24		5+31	LT	
Court Street	5+29		5+39	RT	
Shank Painter Road	24+93		24+93	RT	
Shank Painter Road	25+39		25+41	LT	
Shank Painter Road	37+33		37+40	LT	
Browne Street	9+64		9+68	RT	
Browne Street	9+72		9+76	RT	
Bradford Street	109+43		109+52		LT
Shank Painter Road	10+25		10+88	RT	
Shank Painter Road	10+64		10+82	LT	
Shank Painter Road	10+68		10+71	RT/LT	
Jerome Smith Road	5+22		5+22	RT/LT	
Jerome Smith Road	5+32		5+45	RT	
Jerome Smith Road	5+32		5+45	LT	
Jerome Smith Road	5+45		5+47	LT	
Route 6	112+44		112+46		LT/RT
Route 6	112+84		112+87		LT/RT
Route 6 to Route 6 East	113+12		500+60		LT
Route 6 to Route 6 East	500+74		500+79		LT
Route 6 Roundabout	113+30		500+25		RT/LT

ITEM 506.2 GRANITE CURB TYPE VB – SPLAYED END

STREET	STA	TO	STA	SIDE
Route 6 East	501+36		501+42	RT
Route 6 East	501+36		501+42	LT
Route 6 West	201+21		201+27	RT
Route 6 West	201+21		201+27	LT

ITEM 507.1 GRANITE CURB TYPE T-100 – CURVE

At roundabout truck apron - Radius 43’

ITEM 509. GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT

STREET	STA	TO	STA	OFFSET
Shank Painter Road	10+73		10+87	LT
Shank Painter Road	10+82		10+89	LT
Shank Painter Road	10+98		11+12	LT
Shank Painter Road	10+99		11+07	LT
Shank Painter Road	12+28		13+33	LT
Shank Painter Road	13+23		13+34	LT
Shank Painter Road	13+72		13+80	RT
Shank Painter Road	14+14		14+21	LT
Shank Painter Road	14+14		14+21	RT
Shank Painter Road	14+26		14+35	RT
Shank Painter Road	14+26		14+35	LT
Captain Bertie's Way	5+46		5+52	LT
Captain Bertie's Way	5+64		5+73	LT
Shank Painter Road	15+55		15+62	LT
Shank Painter Road	15+95		16+01	LT
Shank Painter Road	15+68		15+71	RT
Shank Painter Road	16+02		16+10	RT
Shank Painter Road	16+38		16+44	RT
Shank Painter Road	16+66		16+74	LT
Shank Painter Road	17+76		17+83	LT
Shank Painter Road	18+07		18+16	LT
Shank Painter Road	18+65		18+68	LT
Shank Painter Road	18+71		18+80	RT
Shank Painter Road	18+85		18+91	RT
Shank Painter Road	18+75		18+80	LT
Shank Painter Road	18+85		18+88	LT
Shank Painter Road	18+99		19+04	LT
Shank Painter Road	19+37		19+43	RT
Shank Painter Road	19+38		19+40	LT
Shank Painter Road	19+85		19+94	LT

ITEM 509. GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT (Continued)

STREET	STA	TO	STA	OFFSET
Shank Painter Road	20+50		20+59	RT
Shank Painter Road	21+09		21+15	RT
Shank Painter Road	21+40		21+49	RT
Shank Painter Road	22+17		22+23	RT
Shank Painter Road	22+98		22+99	RT
Shank Painter Road	23+40		23+47	LT
Shank Painter Road	24+80		24+84	RT
Shank Painter Road	25+22		25+24	RT
Shank Painter Road	25+41		25+48	LT
Shank Painter Road	25+39		25+48	RT
Shank Painter Road	25+53		25+59	LT
Shank Painter Road	25+53		25+60	RT
Shank Painter Road	26+25		26+30	RT
Shank Painter Road	26+74		26+83	RT
Shank Painter Road	27+00		27+07	RT
Shank Painter Road	27+39		27+47	RT
Shank Painter Road	27+65		27+72	RT
Shank Painter Road	28+04		28+12	RT
Shank Painter Road	31+27		31+33	RT
Shank Painter Road	31+52		31+59	RT
Shank Painter Road	31+74		31+81	RT
Shank Painter Road	31+75		31+82	LT
Shank Painter Road	32+19		32+23	RT
Shank Painter Road	32+25		32+33	LT
Shank Painter Road	32+29		32+33	RT
Shank Painter Road	32+38		32+44	LT
Shank Painter Road	32+38		32+41	RT
Shank Painter Road	32+43		32+47	LT
Shank Painter Road	32+82		32+88	LT
Shank Painter Road	33+89		33+96	RT
Shank Painter Road	34+25		34+33	RT
Shank Painter Road	34+57		34+64	LT
Shank Painter Road	35+59		35+67	LT
Shank Painter Road	35+76		35+83	LT
Shank Painter Road	36+79		36+86	RT
Shank Painter Road	37+81		37+88	RT
Shank Painter Road	38+25		38+33	LT

ITEM 509.1 GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS – CURVED

STREET	STA	TO	STA	OFFSET
Shank Painter Road	11+33		11+37	RT
Shank Painter Road	11+37		11+43	LT
Shank Painter Road	11+46		11+51	LT
Shank Painter Road	11+50		11+61	RT
Shank Painter Road	11+60		11+64	LT
Shank Painter Road	11+68		11+71	LT
Shank Painter Road	12+36		12+42	LT
Shank Painter Road	13+19		13+26	RT
Shank Painter Road	13+68		13+72	RT
Shank Painter Road	14+47		14+55	LT
Shank Painter Road	14+57		14+58	LT
Shank Painter Road	14+93		15+01	LT
Shank Painter Road	15+17		15+23	RT
Shank Painter Road	15+61		15+68	RT
Shank Painter Road	17+59		17+68	RT
Shank Painter Road	17+72		17+76	RT
Shank Painter Road	18+10		18+19	RT
Shank Painter Road	19+40		19+47	RT
Shank Painter Road	19+76		19+83	RT
Shank Painter Road	22+99		23+07	RT
Shank Painter Road	23+49		23+55	RT
Shank Painter Road	24+79		24+92	RT
Shank Painter Road	24+84		24+89	LT
Shank Painter Road	25+29		25+39	LT
Shank Painter Road	25+17		25+22	RT
Shank Painter Road	26+30		26+33	RT
Shank Painter Road	26+64		26+70	RT
Shank Painter Road	30+14		30+21	LT
Shank Painter Road	30+15		30+23	RT
Shank Painter Road	30+23		30+24	LT
Shank Painter Road	30+25		30+28	RT
Shank Painter Road	30+53		30+59	RT
Shank Painter Road	30+60		30+72	RT
Shank Painter Road	38+36		38+47	RT
Shank Painter Road	38+40		38+47	LT
Shank Painter Road	38+50		38+54	LT
Captain Bertie’s Way	5+31		5+52	RT
Browne Street	9+23		9+35	LT

ITEM 514. GRANITE CURB INLET -STRAIGHT

STREET/CB-ID	STA	SIDE
Route 6 Combined / 101-CBCI	111+84.60'	LT
Route 6 Combined / 102-CBCI	111+98.03'	RT
Route 6 Eastbound / 111-CBCI	501+49.26'	LT
Route 6 Eastbound / 112-CBCI	501+50.10'	RT
Route 6 Westbound / 114-CBCI	201+36.83'	LT
Route 6 Westbound / 115-CBCI	201+34.52'	RT
Shank Painter Rd / 125-CBCI	12+41.50’	LT
Shank Painter Rd / 127-CBCI	14+37.75'	LT
Shank Painter Rd / 129-CBCI	14+37.24'	RT
Shank Painter Rd / 130-CBCI	15+14.07'	LT
Shank Painter Rd / 201-CBCI	18+52.44'	LT
Shank Painter Rd / 202-CBCI	18+53.62'	RT
Shank Painter Rd / 204-CBCI	21+23.34'	LT
Shank Painter Rd / 206-CBCI	21+37.43'	RT
Shank Painter Rd / 208-CBCI	22+92.27'	RT
Shank Painter Rd / 209-CBCI	22+98.65'	LT
Shank Painter Rd / 214-CBCI	24+78.77'	RT
Shank Painter Rd / 216-CBCI	25+30.56'	RT
Shank Painter Rd / 217-CBCI	25+48.37'	LT
Shank Painter Rd / 401-CBCI	28+02.58'	RT
Shank Painter Rd / 402-GICI	28+23.72'	LT
Shank Painter Rd / 405-GICI	30+09.02'	LT
Shank Painter Rd / 406-GICI	30+11.66'	RT
Shank Painter Rd / 408-GICI	32+23.64'	LT
Shank Painter Rd / 409-GICI	32+27.22'	RT
Shank Painter Rd / 411-GICI	33+03.93'	LT
Shank Painter Rd / 412-GICI	33+02.80'	RT
Shank Painter Rd / 412-CBCI	33+21.78’	RT
Shank Painter Rd / 421-GICI	35+58.78'	LT

ITEM 516. GRANITE CURB CORNER TYPE A

STREET	STA	SIDE
Shank Painter Rd	20+19	LT
Shank Painter Rd	20+21	LT
Shank Painter Rd	20+54	LT (back to back curb)
Shank Painter Rd	21+20	LT
Shank Painter Rd	21+26	LT
Shank Painter Rd	21+56	LT
Shank Painter Rd	21+65	LT
Shank Painter Rd	22+64	LT
Shank Painter Rd	22+74	LT
Shank Painter Rd	28+53	RT (back to back curb)

ITEM 516. GRANITE CURB CORNER TYPE A (Continued)

STREET	STA	SIDE
Shank Painter Rd	29+09	RT (back to back curb)
Shank Painter Rd	29+82	RT
Shank Painter Rd	29+92	RT
Shank Painter Rd	34+83	LT
Shank Painter Rd	34+86	LT
Shank Painter Rd	37+15	RT
Shank Painter Rd	37+20	RT
Shank Painter Rd	37+17	LT (back to back curb)
Shank Painter Rd	38+25	LT

And as required by the Engineer.

ITEM 580. CURB REMOVED AND RESET

Contingency for any straight curb eligible for reset.

ITEM 590. CURB REMOVED AND STACKED

STREET	STA	TO	STA	SIDE
Shank Painter Road	16+30		17+75	RT
Shank Painter Road	30+50		30+95	LT
Shank Painter Road	31+70		32+50	LT
Shank Painter Road	32+80		33+20	LT
Shank Painter Road	38+15		38+30	Exist Islands

ITEM 620.13 GUARDRAIL, TL-3 (SINGLE FACED)

STREET	STA	TO	STA	SIDE
Shank Painter Road	500+71		502+05	LT

ITEM 620.131 GUARDRAIL, DEEP POST (SINGLE FACED)

STREET	STA	TO	STA	SIDE
Shank Painter Road	32+82		34+37	LT

ITEM 627.1 TRAILING ANCHORAGE

STREET	STA	TO	STA	SIDE
Shank Painter Road	32+85		32+92	LT
Shank Painter Road	500+62		500+71	LT

ITEM 627.82 GUARDRAIL TANGENT END TREATMENT, TL-2

STREET	STA	TO	STA	SIDE
Shank Painter Road	34+05		34+30	LT
Shank Painter Road	201+80		202+05	RT

ITEM 627.83 GUARDRAIL TANGENT END TREATMENT, TL-3

STREET	STA	TO	STA	SIDE
Shank Painter Road	502+05		502+30	LT

ITEM 630.1 HIGHWAY GUARD REMOVED AND STACKED

STREET	STA	TO	STA	SIDE
Shank Painter Road	78+66		81+68	LT
Shank Painter Road	94+65		98+18	LT

ITEM 645.172 72 INCH CHAIN LINE FENCE (PIPE TOP RAIL) VINYL COATED (LINE POST OPTION)

STREET	STA	TO	STA	SIDE
Shank Painter Road	500+42		502+03	LT
Shank Painter Road	24+00		24+90	LT

ITEM 652.072 72 INCH CHAIN LINK FENCE END POST

STREET	STA	SIDE
Router 6	500+42	LT
Shank Painter Rd	502+03	LT
Shank Painter Rd	24+00	LT
Shank Painter Rd	24+90	LT

ITEM 653.072 72 INCH CHAIN LINK FENCE CORNER OR INTERMEDIATE BRACE POST

STREET	STA	TO	STA	SIDE
Shank Painter Road	500+42		502+03	LT
Shank Painter Road	24+00		24+90	LT

ITEM 657. TEMPORARY FENCE

As needed for a contingency for the detention basin at the north of the roundabout and pump station at Court Street construction

ITEM 666. CHAIN LINK FENCE REMOVED AND RESET

STREET	STA	TO	STA	SIDE
Shank Painter Road	11+40		11+90	RT

ITEM 670. FENCE REMOVED AND RESET

As directed by the Engineer

ITEM 685. STONE MASONRY WALL IN CEMENT MORTAR

STREET	STA	TO	STA	SIDE
Shank Painter Road	22+10		22+83	RT

ITEM 697.1 SILT SACK

At proposed drainage catch basins
At existing drainage catch basins to be retained and adjusted

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION

To be used with Item 983.2 Riprap to separate riprap and the existing subbase material.

ITEM 701. CEMENT CONCRETE SIDEWALK

STREET	STA	TO	STA	SIDE
Shank Painter Road	11+12		11+45	LT
Shank Painter Road	11+49		11+57	LT
Shank Painter Road	11+12		13+19	RT
Shank Painter Road	12+24		12+77	LT
Shank Painter Road	13+34		14+14	LT
Shank Painter Road	13+79		14+14	RT
Shank Painter Road	14+35		14+47	LT
Shank Painter Road	14+35		15+16	RT
Shank Painter Road	15+01		15+55	LT
Shank Painter Road	15+71		16+02	RT
Shank Painter Road	16+01		16+66	LT
Shank Painter Road	16+44		17+56	RT
Shank Painter Road	17+83		18+07	LT
Shank Painter Road	18+20		18+71	RT
Shank Painter Road	18+68		18+75	LT
Shank Painter Road	18+88		18+99	LT
Shank Painter Road	18+91		19+38	RT
Shank Painter Road	19+43		19+85	LT
Shank Painter Road	19+83		20+50	RT
Shank Painter Road	20+17		20+23	LT
Shank Painter Road	20+52		20+56	LT
Shank Painter Road	21+15		21+40	RT
Shank Painter Road	21+19		21+28	LT
Shank Painter Road	21+54		21+67	LT
Shank Painter Road	22+23		22+97	RT
Shank Painter Road	22+62		22+74	LT
Shank Painter Road	23+47		24+79	LT
Shank Painter Road	23+56		24+80	RT
Shank Painter Road	25+26		25+39	RT
Shank Painter Road	25+34		25+43	LT
Shank Painter Road	25+59		26+24	RT
Shank Painter Road	25+60		30+79	LT
Shank Painter Road	26+70		26+75	RT
Shank Painter Road	27+07		27+39	RT
Shank Painter Road	27+72		28+04	RT
Shank Painter Road	28+51		28+56	RT
Shank Painter Road	29+06		29+11	RT
Shank Painter Road	29+38		29+43	RT
Shank Painter Road	29+80		29+93	RT
Shank Painter Road	30+14		30+15	RT
Shank Painter Road	30+70		31+26	RT
Shank Painter Road	30+60		30+82	LT
Shank Painter Road	31+59		31+74	RT

ITEM 701. CEMENT CONCRETE SIDEWALK (Continued)

STREET	STA	TO	STA	SIDE	
Shank Painter Road	31+82		32+25	LT	
Shank Painter Road	32+22		32+28	RT	
Shank Painter Road	32+41		33+89	LT	
Shank Painter Road	32+44		33+89	RT	
Shank Painter Road	32+90		34+57	LT	
Shank Painter Road	34+33		36+79	RT	
Shank Painter Road	34+83		34+86	LT	
Shank Painter Road	35+67		35+76	LT	
Shank Painter Road	37+17		37+18	LT	
Shank Painter Road	37+15		37+20	RT	
Shank Painter Road	37+88		38+36	RT	
Shank Painter Road	38+28		38+41	LT	
Shank Painter Road	38+51		38+51	RT	
Bradford Street	108+70		108+90		RT
Captain Bertie's Way	5+24		5+29	LT	
Captain Bertie's Way	5+52		5+52	LT	
Browne Street	9+40		9+64	RT	
Browne Street	10+28		10+32	RT	
Jerome Smith Road	5+19		5+26	MID	
Jerome Smith Road	5+32		5+46	MID	
Jerome Smith Road	5+66		6+21	LT	
Jerome Smith Road	5+34		5+44	RT	

ITEM 701.1 CEMENT CONCRETE SIDEWALK AT DRIVEWAYS

STREET	STA	TO	STA	SIDE
Shank Painter Road	12+77		13+35	LT
Shank Painter Road	15+55		16+01	LT
Shank Painter Road	16+02		16+44	RT
Shank Painter Road	16+66		17+83	LT
Shank Painter Road	18+07		18+68	LT
Shank Painter Road	18+99		19+43	LT
Shank Painter Road	19+85		20+19	LT
Shank Painter Road	20+21		20+54	LT
Shank Painter Road	20+54		21+21	LT
Shank Painter Road	21+26		21+56	LT
Shank Painter Road	21+66		22+62	LT
Shank Painter Road	22+74		23+47	LT
Shank Painter Road	20+50		21+15	RT
Shank Painter Road	21+40		22+23	RT
Shank Painter Road	26+74		27+07	RT
Shank Painter Road	27+39		27+72	RT

ITEM 701.1 CEMENT CONCRETE SIDEWALK AT DRIVEWAYS (Continued)

STREET	STA	TO	STA	SIDE
Shank Painter Road	28+04		28+53	RT
Shank Painter Road	28+55		29+08	RT
Shank Painter Road	29+09		29+40	RT
Shank Painter Road	29+41		29+82	RT
Shank Painter Road	29+91		30+16	RT
Shank Painter Road	30+82		31+82	LT
Shank Painter Road	31+25		31+59	RT
Shank Painter Road	31+74		32+23	RT
Shank Painter Road	32+43		32+90	LT
Shank Painter Road	33+89		34+33	RT
Shank Painter Road	34+57		34+83	LT
Shank Painter Road	34+86		34+86	LT
Shank Painter Road	35+76		37+16	LT
Shank Painter Road	37+17		38+31	LT
Shank Painter Road	36+79		37+15	RT
Shank Painter Road	37+20		37+88	RT

ITEM 701.2 CEMENT CONCRETE PEDESTRIAN CURB RAMP

STREET	STA	TO	STA	SIDE
Shank Painter Road	10+88		11+12	
Shank Painter Road	10+89		10+98	
Shank Painter Road	10+89		10+99	
Shank Painter Road	10+73		11+10	
Shank Painter Road	11+36		11+50	
Shank Painter Road	11+43		11+52	
Shank Painter Road	11+64		11+68	
Shank Painter Road	13+19		13+28	
Shank Painter Road	13+67		13+80	
Shank Painter Road	14+14		14+35	
Shank Painter Road	14+14		14+35	
Shank Painter Road	14+43		14+57	
Shank Painter Road	14+90		15+01	
Shank Painter Road	15+16		15+27	
Shank Painter Road	15+58		15+71	
Shank Painter Road	17+56		17+71	
Shank Painter Road	18+08		18+20	
Shank Painter Road	18+71		18+91	
Shank Painter Road	18+75		18+88	
Shank Painter Road	19+43		19+55	
Shank Painter Road	19+74		19+85	

ITEM 701.2 CEMENT CONCRETE PEDESTRIAN CURB RAMP (Continued)

STREET	STA	TO	STA	SIDE
Shank Painter Road	22+97		23+12	
Shank Painter Road	23+46		23+56	
Shank Painter Road	24+79		24+96	
Shank Painter Road	24+80		24+92	
Shank Painter Road	25+17		25+24	
Shank Painter Road	25+26		25+34	
Shank Painter Road	25+39		25+59	
Shank Painter Road	25+43		25+60	
Shank Painter Road	26+24		26+33	
Shank Painter Road	26+61		26+69	
Shank Painter Road	30+50		30+59	
Shank Painter Road	32+25		32+41	
Shank Painter Road	32+29		32+44	
Shank Painter Road	38+33		38+50	
Shank Painter Road	38+33		38+49	
Brown Street	9+64		9+79	
Brown Street	10+15		10+27	
Jerome Smith Road	5+26		5+32	
Jerome Smith Road	5+24		5+34	

ITEM 701.3 STAMPED CEMENT CONCRETE TRUCK APRON

At the roundabout

ITEM 702. HOT MIX ASPHALT SIDEWALK OR DRIVEWAY

STREET	STA	TO	STA	SIDE
Route 6 (EB) Bike Path	112+60		503+02	LT
Route 6 (EB) Bike Path	200+51		202+92	RT
Captain Bertie's Way Drwy		5+27	5+52	LT
Captain Bertie's Way Drwy		5+63	6+08	LT
Shank Painter Road	12+93		13+22	LT
Shank Painter Road	13+19		13+72	RT
Shank Painter Road	15+16		15+68	RT
Shank Painter Road	15+62		15+96	LT
Shank Painter Road	16+10		16+38	RT
Shank Painter Road	16+57		17+76	LT
Shank Painter Road	17+56		18+20	RT
Shank Painter Road	18+16		16+65	LT

ITEM 702. HOT MIX ASPHALT SIDEWALK OR DRIVEWAY (Continued)

STREET	STA	TO	STA	SIDE
Shank Painter Road	19+04		19+37	LT
Shank Painter Road	19+88		20+17	LT
Shank Painter Road	20+23		20+51	LT
Shank Painter Road	20+51		21+27	LT
Shank Painter Road	20+59		21+21	RT
Shank Painter Road	21+28		21+54	LT
Shank Painter Road	21+34		22+13	RT
Shank Painter Road	21+67		22+62	LT
Shank Painter Road	21+61		23+40	LT
Shank Painter Road	22+98		22+55	RT
Shank Painter Road	24+84		25+22	RT
Shank Painter Road	26+30		26+70	RT
Shank Painter Road	28+11		28+51	RT
Shank Painter Road	28+57		29+80	RT
Shank Painter Road	29+93		20+13	RT
Shank Painter Road	30+90		30+13	RT
Shank Painter Road	30+86		31+75	RT
Shank Painter Road	31+81		31+52	RT
Shank Painter Road	32+49		32+19	LT
Shank Painter Road	33+95		34+22	RT
Shank Painter Road	34+36		35+32	LT
Shank Painter Road	35+82		38+23	LT

ITEM 702.1 FLEXIBLE POROUS PAVEMENT FOR TREE PIT AREAS

STREET	STA	SIDE
Shank Painter Rd	11+62	RT
Shank Painter Rd	12+13	RT
Shank Painter Rd	14+56	RT
Shank Painter Rd	18+32	RT
Shank Painter Rd	20+09	RT
Shank Painter Rd	22+39	RT
Shank Painter Rd	25+65	RT
Shank Painter Rd	25+87	RT
Shank Painter Rd	31+05	RT
Shank Painter Rd	33+58	RT
Shank Painter Rd	36+49	RT

ITEM 706. BRICK WALK

STREET	STA	SIDE
Shank Painter Road	19+76	LT
Shank Painter Road	20+21	LT
Shank Painter Road	27+22	RT

ITEM 706.7 SEASHELL WALKWAY OR DRIVEWAY REMOVED AND RESET

STREET	STA	TO	STA	SIDE
Shank Painter Road	36+20		38+24	LT
Shank Painter Road	36+83		37+12	RT

ITEM 706.8 MISCELLANEOUS SURFACE WALKWAY OR DRIVEWAY REMOVED AND RESET

STREET	STA
Shank Painter Road	26+95

ITEM 707.15 PARK BENCH REMOVED AND RESET

STREET	STA	SIDE
Shank Painter Road	32+45	RT

ITEM 707.16 BIKE RACK REMOVED AND RESET

STREET	STA	SIDE
Shank Painter Road	32+62	RT

ITEM 711. BOUND REMOVED AND RESET

As requiured by the Engineer

ITEM 715. RURAL MAILBOX REMOVED AND RESET

STREET	STA	SIDE
Jerome Smith Road	5+45.23	RT
Jerome Smith Road	5+46.64	RT
Jerome Smith Road	5+48.08	RT
Shank Painter Road	16+51.89	LT
Shank Painter Road	19+98.13	RT
Shank Painter Road	23+83.75	KT
Shank Painter Road	28+57.54	RT
Shank Painter Road	34+21.95	RT

ITEM 767.121 SEDIMENT CONTROL BARRIER

STREET	STA	TO	STA	SIDE
Route 6	111+18		113+54	LT
Route 6 EB	500+00		504+26	LT
Shank Painter Road	23+42		24+53	LT
Shank Painter Road	32+74		34+35	LT
Shank Painter Road	34+21		36+74	RT

ITEM 769. PAVEMENT MILLING MULCH UNDER GUARD RAIL

STREET	STA	TO	STA	OFFSET
Shank Painter Road	32+83		34+30	LT

ITEM 776.543 MAPLE – RED – OCTOBER GLORY 2-2.5 INCH CALIPER

STREET	STA	SIDE
Shank Painter Rd	97+50	RT

ITEM 777.328 OAK – WHITE 2-2.5 INCH CALIPER

STREET	STA	SIDE
Shank Painter Rd	113+18	LT

ITEM 779.328 ELM – PRINCETON 2-2.5 INCH CALIPER

STREET	STA	SIDE
Route 6 Combine	111+94	LT
Route 6 Combine	112+85	LT
Route 6 (EB)	502+95	LT
Shank Painter Rd	11+62	RT
Shank Painter Rd	16+47	LT
Shank Painter Rd	17+24	RT
Shank Painter Rd	19+80	LT
Shank Painter Rd	20+09	RT
Shank Painter Rd	23+81	RT
Shank Painter Rd	30+82	RT
Shank Painter Rd	33+07	RT
Shank Painter Rd	36+49	RT

ITEM 783.467 TUPELO 2-2.5 INCH CALIPER

STREET	STA	SIDE
Route 6 Combine	111+70	LT
Route 6 Combine	112+57	LT
Route 6 (EB)	502+67	LT
Shank Painter Rd	12+13	RT
Shank Painter Rd	14+56	RT
Shank Painter Rd	15+06	LT
Shank Painter Rd	15+43	LT
Shank Painter Rd	18+32	RT
Shank Painter Rd	22+39	RT
Shank Painter Rd	25+65	RT
Shank Painter Rd	25+87	RT
Shank Painter Rd	31+05	RT
Shank Painter Rd	33+58	RT

ITEM 794.803 SWEETFERN #1

STREET	STA	SIDE
Roundabout Center Island		

ITEM 795.155 WINTERBERRY – FEMALE 18-24 INCH / #1

STREET	STA	SIDE
Roundabout Center Island		

ITEM 796.201 LITTLE BLUESTEM – 1 GAL

STREET	STA	SIDE
Roundabout Center Island		

ITEM 796.471 BEACHGRASS – AMERICAN BARE ROOT

Along Route 6 southern barrel withing the 4' buffer between the walk path and bike path. Planting spacing a 2' O.C. final location as directed by Town and the Engineer.

ITEM 803.42 4 INCH ELECTRICAL CONDUIT TYPE NM – PLASTIC (DOUBLE)

STREET	STA	TO	STA
Shank Painter	29+10 RT		29+45 RT

ITEM 804.2 2 INCH ELECTRICAL CONDUIT TYPE NM – PLASTIC (UL)

UTILITY	STA	TO	STA	UTILITY
UP #9255/483	201+75 RT		201+85 RT	Control Cabinet

ITEM 804.3 3 INCH ELECTRICAL CONDUIT TYPE NM – PLASTIC -(UL)

STREET	CONNECTION	STA	TO CONNECTION	STA
Controller Cabinet			LP-1	201+53 RT
Route 6 (WB)	LP-1	201+53 RT	LP-2	200+64 RT
Route 6 (WB)	LP-2	200+64 RT	LP-3	11+05 RT
Shank Painter	LP-3	11+05 RT	LP-4	10+80 LT
	LP-4	10+80 LT	LP-5	10+42 RT
	LP-5	10+42 RT	LP-6	112+60 RT
Route 6 Combine	LP-6	112+60 RT	LP-7	111+65 RT
	Crossing Shank Painter			11+80
	LP-8	111+65 RT	LP-9	112+60 LT
	LP-9	112+60 LT	LP-10	113+10 LT
	LP-10	113+10 LT	LP-11	500+60 LT
Route 6 (EB)	LP-11	500+60 LT	LP-12	502+30 LT
	Crossing Rte 6 (EB - WB)			501+30
	Crossing Rte 6 EB - center island			200+70

ITEM 811.22 ELECTRIC HANDHOLE SD2.022

STREET	CONNECTION	STA
Route 6 (WB)	LP-1	201+53 RT
Route 6 (WB)	LP-2	200+64 RT
	Crossing	200+70 RT & LT
Shank Painter	LP-3	11+05 RT
	LP-4	10+80 LT
	LP-5	10+42 RT
	Crossing	10+80 RT & LT
Route 6 Combine	LP-6	112+60 RT
	LP-7	111+65 RT
	LP-8	112+60 LT
	LP-9	113+10 LT
Route 6 (EB)	LP-10	500+60 LT
	LP-11	501+48 LT
	LP-12	502+30 LT
	Crossing	501+30 RT

ITEM 812.10 LIGHT STANDARD FOUNDATION SD3.010

STREET	CONNECTION	STA
Route 6 (WB)	LP-1	201+53 RT
Route 6 (WB)	LP-2	200+64 RT
Shank Painter	LP-3	11+05 RT
	LP-4	10+80 LT
	LP-5	10+42 RT
Route 6 Combine	LP-6	112+60 RT
	LP-7	111+65 RT
	LP-8	112+60 LT
	LP-9	113+10 LT
Route 6 (EB)	LP-10	500+60 LT
	LP-11	501+48 LT
	LP-12	502+30 LT

ITEM 812.20 LIGHTING LOAD CENTER FOUNDATION

STREET	STA	SIDE
Route 6 (WB)	201+85	RT

ITEM 812.992 ORNAMENTAL LIGHT FIXTURE TYPE A (PEDESTRIAN)

STREET	CONNECTION	STA
Route 6 (WB)	LP-1	201+53 RT
Route 6 (WB)	LP-2	200+64 RT
Shank Painter	LP-3	11+05 RT
	LP-4	10+80 LT
	LP-5	10+42 RT
Route 6 Combine	LP-6	112+60 RT
	LP-7	111+65 RT
	LP-8	112+60 LT
	LP-9	113+10 LT
Route 6 (EB)	LP-10	500+60 LT
	LP-11	501+48 LT
	LP-12	502+30 LT

ITEM 813.72 GROUND ROD 10 FEET LONG

STREET	CONNECTION	STA
Route 6 (WB)	LP-1	201+53 RT
Route 6 (WB)	LP-2	200+64 RT
Shank Painter	LP-3	11+05 RT
	LP-4	10+80 LT
	LP-5	10+42 RT
Route 6 Combine	LP-6	112+60 RT
	LP-7	111+65 RT
	LP-8	112+60 LT
	LP-9	113+10 LT
Route 6 (EB)	LP-10	500+60 LT
	LP-11	501+48 LT
	LP-12	502+30 LT

ITEM 823.61 HIGHWAY LIGHTING LOAD CENTER NO.1

STREET	STA	SIDE
Route 6 (WB)	201+85	RT

ITEM 824.62 SOLAR-POWERED FLASHING SIGN ASSEMBLY

STREET/SIGN-ID	STA	SIDE
W2-6	1	

ITEM 826.7 ELECTRIC SERVICE RISER RELOCATION

STREET/UP-ID	STA	SIDE
Shank Painter Road 87/204	12+89	RT
Shank Painter Road 9255/485	13+67	LT
Shank Painter Road 9255/487	16+60	LT
Shank Painter Road 255/488	18+05	LT
Shank Painter Road 87/14	19+87	LT
Shank Painter Road 87/12A	22+65	RT
Shank Painter Road 87/8S	28+10	RT
Shank Painter Road 87/7s	29+08	RT
Shank Painter Road 87/5	32+02	LT
Shank Painter Road 87/4	33+06	LT
Shank Painter Road 87/3	34+30	LT
Shank Painter Road 87/2	35+82	LT

ITEM 866.04 GREEN BICYCLE LANE TREATMENT (MMA)

Shared Use Path	741+60	741+90	LT
Shared Use Path	751+25	751+55	LT
Shared Use Path	755+85	756+20	LT
Shared Use Path	788+10	758+40	LT
Shared Use Path	11+65	11+90	LT
Shared Use Path	11+50	12+50	LT

ITEM 866.106 6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)

STREET	STA	TO	STA	SIDE
Shank Painter Rd	10+63		10+63	LT/RT
Shank Painter Rd	11+00		11+33	LT
Shank Painter Rd	11+00		14+16	RT
Shank Painter Rd	11+47		14+16	RT
Shank Painter Rd	11+00		14+16	RT
Shank Painter Rd	11+33		12+63	LT
Shank Painter Rd	11+15		12+63	LT
Shank Painter Rd	12+63		14+16	LT
Shank Painter Rd	12+63		14+16	LT
Shank Painter Rd	14+31		14+43	LT
Shank Painter Rd	14+31		14+43	LT
Shank Painter Rd	14+31		18+74	RT
Shank Painter Rd	14+31		18+74	RT
Shank Painter Rd	14+33		14+95	LT
Shank Painter Rd	14+95		18+74	LT
Shank Painter Rd	14+95		18+74	LT
Shank Painter Rd	18+90		24+78	LT
Shank Painter Rd	18+90		24+78	LT
Shank Painter Rd	18+90		19+40	RT
Shank Painter Rd	18+90		19+40	RT
Shank Painter Rd	19+40		19+84	RT

ITEM 866.106 6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) (Continued)

STREET	STA	TO	STA	SIDE
Shank Painter Rd	19+84		22+99	RT
Shank Painter Rd	19+84		22+99	RT
Shank Painter Rd	22+99		23+55	RT
Shank Painter Rd	23+55		24+89	RT
Shank Painter Rd	23+55		24+89	RT
Shank Painter Rd	24+78		25+42	LT
Shank Painter Rd	24+89		25+21	RT
Shank Painter Rd	25+21		25+43	RT
Shank Painter Rd	25+21		25+43	RT
Shank Painter Rd	25+58		30+16	LT
Shank Painter Rd	25+58		30+16	LT
Shank Painter Rd	25+58		30+16	RT
Shank Painter Rd	25+58		30+16	RT
Shank Painter Rd	30+31		30+59	LT
Shank Painter Rd	30+31		30+67	RT
Shank Painter Rd	30+59		32+27	LT
Shank Painter Rd	30+59		32+27	LT
Shank Painter Rd	30+67		32+27	RT
Shank Painter Rd	30+67		32+27	RT
Shank Painter Rd	32+43		37+09	LT
Shank Painter Rd	32+43		37+09	LT
Shank Painter Rd	32+43		37+09	RT
Shank Painter Rd	32+43		37+09	RT
Shank Painter Rd	35+30		35+70	LT
Shank Painter Rd	37+09		37+85	LT
Shank Painter Rd	37+09		37+84	RT
Shank Painter Rd	37+09		37+78	RT
Shank Painter Rd	37+85		38+38	LT
Shank Painter Rd	37+85		38+34	RT
Shank Painter Rd	37+78		38+34	RT
Route 6 Combined	70+75		112+59	LT
Route 6 Combined	70+75		112+60	RT
Route 6 Combined	112+67		113+44	RT
Route 6 Combined	112+65		113+55	LT
Route 6 Combined	112+89		112+92	LT/RT
Route 6 Westbound	200+45		204+10	RT
Route 6 Westbound	200+45		200+65	LT
Route 6 Eastbound	500+00		508+49	LT
Shared Use Path	718+45		741+55	LT
Shared Use Path	741+93		751+22	LT
Shared Use Path	751+65		755+84	LT
Shared Use Path	756+27		758+07	LT
Shared Use Path	758+40		759+95	LT

ITEM 866.112 12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)

STREET	STA	TO	STA	SIDE
Shank Painter Rd	10+45		10+62	LT
Shank Painter Rd	10+94		10+94	LT/RT
Shank Painter Rd	13+23		13+68	RT
Shank Painter Rd	13+48		13+67	RT
Shank Painter Rd	14+23		14+23	LT/RT
Shank Painter Rd	15+22		15+63	RT
Shank Painter Rd	15+42		15+57	RT
Shank Painter Rd	18+82		18+82	LT/RT
Shank Painter Rd	19+45		19+78	RT
Shank Painter Rd	19+63		19+72	RT
Shank Painter Rd	23+04		23+51	RT
Shank Painter Rd	23+31		23+45	RT
Shank Painter Rd	25+05		25+19	RT
Shank Painter Rd	25+50		25+50	LT/RT
Shank Painter Rd	30+24		30+24	LT/RT
Shank Painter Rd	32+35		32+35	LT/RT
Shank Painter Rd	38+35		38+35	LT/RT
Shank Painter Rd	38+42		38+42	LT/RT
Jerome Smith Rd	5+29		5+29	LT/RT
Jerome Smith Rd	5+37		5+37	RT
Captain Bertie’s Way		5+23	5+23	LT/RT
Captain Bertie’s Way		5+37	5+30	RT
Court Street	5+21		5+21	LT/RT
Court Street	5+30		5+30	RT
Browne Street	9+68		9+68	LT
Browne Street	9+75		9+75	LT/RT
Browne Street	10+20		10+20	LT/RT
Browne Street	10+28		10+28	LT
Route 6 Eastbound	500+58		500+67	LT/RT
Route 6 Combined	112+92		113+00	RT
Shared Use Path	741+58		741+88	RT
Shared Use Path	741+58		741+88	LT/RT
Shared Use Path	751+26		751+61	RT
Shared Use Path	751+26		751+61	LT/RT
Shared Use Path	755+88		756+23	RT
Shared Use Path	755+88		756+23	LT/RT
Shared Use Path	758+08		758+38	RT
Shared Use Path	758+08		758+38	LT/RT
Shared Use Path	760+90		760+90	RT

ITEM 867.106 6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)

STREET	STA	TO	STA	SIDE
Shank Painter Rd	10+62		10+83	LT/RT
Shank Painter Rd	11+04		11+67	LT/RT
Shank Painter Rd	12+48		14+15	LT/RT
Shank Painter Rd	14+31		14+43	LT/RT
Shank Painter Rd	14+95		18+73	LT/RT
Shank Painter Rd	18+90		23+08	LT/RT
Shank Painter Rd	23+44		24+78	LT/RT
Shank Painter Rd	25+38		25+42	LT/RT
Shank Painter Rd	25+58		30+13	LT/RT
Shank Painter Rd	30+60		32+27	LT/RT
Shank Painter Rd	32+43		37+41	LT/RT
Jerome Smith Rd	5+37		6+20	LT/RT
Captain Bertie's Way		5+32	6+08	LT/RT
Route 6 Eastbound	500+68		504+25	RT
Route 6 Westbound	200+65		204+10	LT
Route 6 Combined	70+75		112+61	LT/RT
Route 6 Combined	112+71		123+93	LT/RT
Shared Use Path	760+57		760+90	LT/RT

ITEM 867.112 12 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)

STREET	STA	TO	STA	SIDE
Shank Painter Rd	11+00		11+67	LT/RT
Route 6 Combined	112+08		112+42	LT/RT

ITEM 874.4 TRAFFIC SIGN REMOVED AND STACKED

STREET	STA	TO	STA	SIDE
Shank Painter Rd	11+00		38+65.95	LT/RT
Route 6	70+75		113+54.97	LT/RT
Route 6	200+00		207+60.34	
Route 6	500+00		510+00	
Route 6 (Throughout)		Throughout	Throughout	

ITEM 901. 4000 PSI, 1.5 INCH, 565 CEMENT CONCRETE

Concrete coping and footing for cemented stone masonry wall

ITEM 996.4 PREFABRICATED MODULAR BLOCK GRAVITY RETAINING WALL

STREET	STA	TO	STA
Wall No. 1	Wall Profile Baseline Sta.		
	10+00		10+12.48
	10+12.48		10+55.68
	10+55.68		11+29.44
	11+29.44		11+40.63
	11+40.63		11+77.43
	11+77.43		11+88.64
	11+88.64		11+94.00
Wall No. 3	Wall Profile Baseline Sta.		
	20+00		20+19.38
	20+19.38		20+28.99
	20+28.99		20+51.33
	20+51.33		20+65.71

*** END OF DOCUMENT ***

DOCUMENT A00808

PROJECT UTILITY COORDINATION FORM

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Project Utilities Coordination (PUC) Form

CONTACTS AND GENERAL UTILITY INFORMATION

7/22/2026
Revision Date:

7/22/2026
PRINTED

City/Town:	Project File #:	PUC Completed by:	Utility Pole Set:	
Provincetown	608744	MD	Eversource Electric	
Route/Street:	**Resident Engineer:**	**Mass DOT PM:**	**Scheduled Ad Date:**	**Total Poles Relocated:**
Shank Painter Road		Thomas Currier	8/8/2026	31

Consultant:	Contact:	Office #	Cell #	Email
Apex Companies, LLC	Benny Hung	(617) 657-0259	(781) 866-9900	benny.hung@apexcos.com

Utility Company	Contact	Office #	Cell #	Email	Scope, Budget, Duration Submitted		Reimbursement			Potential for District Initiated Early Relocation *		Utilities On Bridge/Structure		Utilities Underground (UG) /Aerial (OH)	
					Yes	No	Agreement	Non-Reimb'le	Notes	YES	NO	YES	NO	UG	OH
Eversource Electric	Ned Sadowski	(508) 441-5832		ned.sadowski@eversource.com	x		x				x		x		x
Eversource Fiber	Bechir El Khoury	(781) 441-3864		bechir.khoury@eversource.com	x		x				x		x		x
Open Cape	Corinne Green	(508) 524-5903		Corinne@opencape.org	x		x				x		x		x
Comcast	Michael Cook	(978) 848-5163		Michael_Cook7@comcast.com	x		x				x		x		x
Verizon	Karen Mealey	(774) 409-3160		karen.m.mealey@verizon.com	x		x				x		x		x
Verizon Wireless Small Cell	Sean Conway	(508) 320-2017		sean.conway@verizonwireless.com		x	x				x		x		x
Provincetown Fire Department	James Roderick	(508) 487-7023		jjroderick@provincetown-ma.gov	x		x				x		x		x
Provincetown DPW	Jim Vincent	(508) 487-7060		jvincent@provincetown-ma.gov		x	x		Work to be performed by the Contractor as a contract item.		x		x		x

Utility Relocation Notes for MassDOT Contractor

Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office with 7 Calendar Days advance notification in order to validate the current progress and provide the required 30 Days advance notice-to-proceed for the first Utility - and each subsequent Utility. These advance notifications are to be identified in the Contractor's Schedules (Pre-Con preparation, Baseline, Subnets, and Updated/Monthly Schedules) as specified in Subsection 8.02 (for DBB Contracts) and/or Section 9 (of DB Contracts). Note: The durations included below do not include these lead-times. See Additional 'Important Basis notes for Contractor' - on last PUC Form page.

Additional notes:

Suggested Sequence of Relocation (Based on Consultant proposed construction staging)

The sequence as detailed on the following pages is based on the consultants proposed staging plan. This information was compiled through meetings that included all of the utilities listed below along with the designer and the Town of Provincetown . The information provided is the best available information prior to project advertisement.

Proposal No. 608744-136412

Is 'enabling' (prep) work, by the Contractor, necessary prior to the start of the first series of utility relocations:	Yes	No
	x	

Has any of the Utility work been identified to work concurrently	Yes	No
		x

7/22/2026
PRINTED

massDOT Massachusetts Department of Transportation Highway Division

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work				Access Restraint & Limitations of Operations Notes	
					Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Should an AR be considered for the Contractor ?	
					Exclusive Utility on site	Concurrent Utilities	Contractor Off-Site	Contractor Concurrent		
	C = Contractor	U = Utility Co.			Utility working with no other Utilities in vicinity	Utility working with other Utilities on site	No Contractor physical construction operations on-site (while Utility Contractor and Utility are working on-site - but NOT in the same vicinity	Contractor Concurrent - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
	C		>Contractor to notify Utilities 30 days prior to starting work. >Contractor to perform tree trimming, clear and grub, construct proposed retaining walls, and individual tree removal as needed.							
			UTILITY OPERATIONS - Aerial							
Task: 1			***Eversource Electric***							
		U	Eversource-Electric - Set 32 New Utility Poles	36	x			x		
		U	Eversource-Electric - Frame for messenger pull	16	x			x		
		U	Eversource-Electric - Pull in new messenger cable	3	x			x		
		U	Eversource-Electric - Frame new 477 Spacer cable	16	x			x		
		U	Eversource-Electric - Pull in new 477 Spacer cable	3	x			x		
		U	Eversource-Electric - Take down rollers & install spacers	16	x			x		
		U	Eversource-Electric - Connect services and cut-over load & Risers	45	x			x		
		U	Eversource-Electric - Cut down wire remove cable	20	x			x		
			Sub-Total	**155**						
Task: 2			***Provincetown - DPW***							
	C		**MassDOT Contractor - Call in WO# with Eversource Electric for connect / disconnect and pay all fees.	1	x			x		
	C		**MassDOT Contractor - R&R pole mounted street lights.	15	x			x		
			Sub-Total	**16**						
Task: 3			***Verizon Wireless Small Cell***							
		U	**Verizon Wireless Small Cell - R&R pole mounted small cell equipment on UP#87/12A.	5	x			x		
			Sub-Total	**5**						
Task: 4			***Open Cape***							
		U	Open Cape - Line crews to install 900' of ADSS-72 from P 9255/482 to P 9255/484	1	x			x		
		U	Open Cape - Line crews to install 4000' of ADSS-72 from P 122/2 Jerome Smith Rd to P 87/2 Shank Painter Rd	2	x			x		
		U	Open Cape - Slice techs to build and perform cutover butt and ring cut splicing along route at 6 locations as identified on plans	1	x			x		
		U	Open Cape - P 9221482, P 9255/484, P 12212, P 9255/488, P 87/6, P 87/2	1	x			x		
		U	Open Cape - P 9255/488 contractor to expose conduit, place hand hole and sweep to new riser pole	1	x			x		
		U	Open Cape - P 8715 contractor to expose steel pipe, place hand hole and sweep to new riser pole	1	x			x		
		U	Open Cape - splice locations will be built and prepped prior to the night of the cutover in preperation for the cutover night	1	x			x		
		U	Open Cape - On cutover night, line crews to trim & move cables as needed	1	x			x		
		U	Open Cape - Line crews to wreck out existing OpenCape ADSS-72F and ADSS-24F after new cable install and cutover splicing has been completed	2	x			x		
			Sub-Total	**11**						
Task: 5			***Eversource Fiber***							
		U	Eversource Fiber - Relocate existing fiber to new utility poles on Shank Painter and Jerome Smith Rd	2	x			x		
		U	Eversource Fiber - Assist contractor on site -Monitor traffic on E-306 fiber as fiber contractor does the transfer to new poles. E-306 is between Sta 928 and BESS Control House	1	x			x		
			Sub-Total	**3**						
Task: 6			***Provincetown - Fire Department***							
		U	Provincetown - Fire Department - Remove Communication/alarm wire from poles	1	x			x		
			Sub-Total	**1**						
Task: 7			***Comcast***							
		U	Comcast - Strand Construction	4	x			x		
		U	Comcast - Lash New Trunk/Feeder Cable	5	x			x		
		U	Comcast - Audit Fiber	3	x			x		
		U	Comcast - Underground Construction Coax	3	x			x		
		U	Comcast - Underground Construction Fiber	3	x			x		
		U	Comcast - Cold Splice New cable	3	x			x		
		U	Comcast - Reroute underground drops to new pole locations	3	x			x		
		U	Comcast - Cut over new coax system	2	x			x		
		U	Comcast - Cut over new fiber system	1	x			x		
		U	Comcast - De/Relash existing fiber, wreck out old cables	3	x			x		
			Sub-Total	**30**						

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Access Restraint & Limitations of Operations Notes Should an AR be considered for the Contractor ?	
	C = Contractor	U = Utility Co.			Exclusive Utility on site: Utility working with no other Utilities in vicinity	Concurrent Utilities: Utility working with other Utilities on site	Contractor Off-Site: No Contractor physical construction operations on-site (while Utility	Contractor Concurrent: Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
Task: 8			***Verizon***							
		U	Verizon - VERIZON LINE PLACE ALL NEW STRAND & GUYING	12	x			x		
		U	Verizon - VERIZON LINE TO PLACE ALL NEW COPPER CABLE	12	x			x		
		U	Verizon - VERIZON LINE TO PLACE ALL NEW CFIBER CABLE	3	x			x		
		U	Verizon - VERIZON LINE TO PLACE ALL NEW UNDERGROUND FIBER CABLES IN DUCTS	2	x			x		
		U	Verizon - VERIZON CWI TO RELOCATE DUCTS AND HANDLE NECESSARY UNDERGROUND WORK	17	x			x		
		U	Verizon - VERIZON SPLICE TO JOIN ALL NEW COPPER CABLE	20	x			x		
		U	Verizon - VERIZON SPLICE TO JOIN ALL NEW FIBER CABLE	3	x			x		
		U	Verizon - VERIZON SPLICE TO TRIMN ALL OLD COPPER CABLE	6	x			x		
		U	Verizon - VERIZON SPLICE TO TRIMN ALL OLD FIBER CABLE	2	x			x		
		U	Verizon - VERIZON LINE TO REMOVE ALL OLD CABLES (COPPER & FIBER), ANCHORS, GUYING	10	x			x		
		U	Verizon - VERIZON LINE TO REMOVE ALL OLD POLES (30POLES)	15	x			x		
			Sub-Total	**102**						
Task: 9			***Eversource Electric***							
		U	Eversource Electric - Remove 3 poles	3	x			x		
			Sub-Total	**3**						

IMPORTANT BASIS NOTES - FOR CONTRACTOR

1	Unless otherwise specified in the MassDOT Construction Contract, or unless specifically noted within this PUC Form, these durations (herein) are based upon the Contractor providing *unimpeded access* to the Utility company to perform Utility relocations (see Note 5 - Access).
2	"Concurrent Utilities" operations noted herein, are to signify those Utility Company operations that can be worked concurrently (e.g. Utility A and Utility B work on-site together) - MassDOT and the Contractor are to prepare NTPs to Utilities accordingly.
3	"Potential Access Restraints" noted within this PUC Form are for planning purposes. See MassDOT Contract for Contractual Access Restraints (refer to Subsections 8.02, 8.03, and/or 8.06 for Design Bid Build Contracts and Volume II Section 9 for Design Build Contracts).
4	Utility non-work periods - For planning purposes, the durations above contain some non work days (contingency) for New England conditions (precipitation, high temperatures, low temperatures, snow, ice). Gas line work however, typically has a seasonal restriction and can NOT be installed from 15-November to 15-March. Municipally Owned Electric and Gas Utilities are also restricted from proceeding from 15-November to 15-March. The Contractor shall (and the CTD plan) reflect this calendar restriction within the schedule (unless otherwise note).
5	Access - Unless otherwise noted in the Contract, and in addition to the 'enabling' notes above, the Contractor must provide safe and unimpeded access (for trucks, lifts, cranes, etc.) to the Utilities, to allow for the proposed relocation(s) - including but not limited to snow removal, clearing and grubbing, guard rail removal, barrier removal, tree removal, and grading.
6	For all MassDOT construction contracts issued after January 2014, the new Utility Coordination/documentation specification is required. This is Section 8.14 in Design-Bid-Build Contracts (see Design-Build index reference for applicable section #).
7	Prior to starting any and all enabling work for Utilities, the Contractor is to plan in advance with submittals and approved durations.
8	* Potential District Initiated Early Utility Relocation - if noted herein, the District reserves the right to initiate early utility relocation in advance of the Contract NTP. In submitting a bid price and in the development/basis of the Baseline Schedule, the Contractor shall not plan the Work with the potential benefit of any form of 'early utility relocation.' As a requirement of the Baseline submission, unless otherwise noted in this Specification, the earliest that the first Utility company is to receive the 30 days advance notification to mobilize to the site, will be 7 calendar days after the pre-construction meeting and never sooner than 7 days after the Contract NTP.
9	** Assumed Duration, Not Provided By Utility Company.

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DOCUMENT A00811

WATERING LOG
for
MassDOT Plantings

Watering Log for MassDOT Plantings

Project Description:

Contract No:

Project No:

Plant Locations/s: (Attach planting plan/s as necessary)

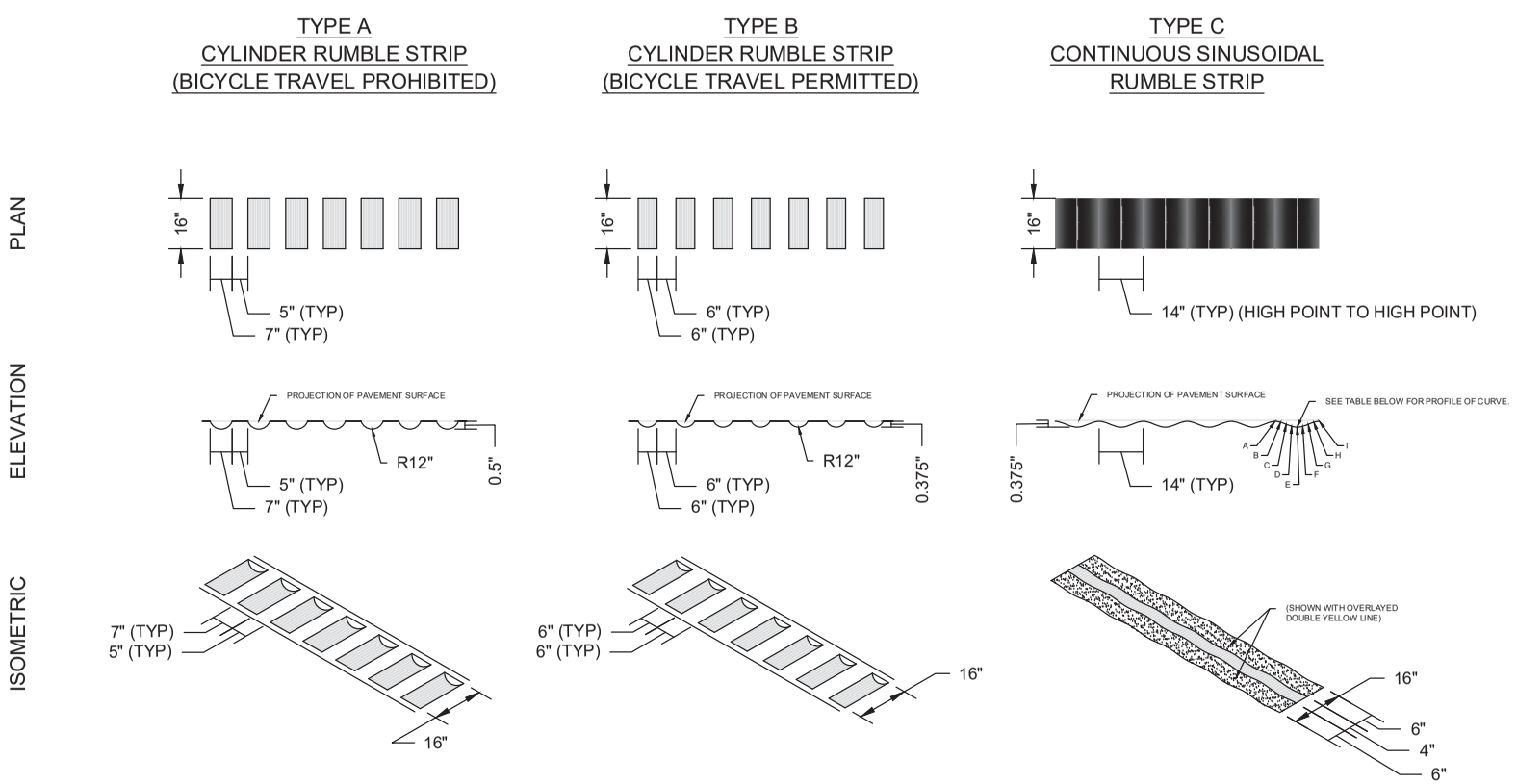
Notes:

	Separate logs shall be kept to track areas or plants with different watering schedules. Trees shall receive a minimum of 10 gallons with each watering and shrubs a minimum of 5 gallons. Provide note that if watering is not performed as scheduled due to rain. Record date of rainfall and amount.												
Date Watered													
Landscape Contractor Initial													
Prime Contractor Initial													
Date Watered													
Landscape Contractor Initial													
Prime Contractor Initial													

Each week, following watering, Log shall be submitted to the MassDOT Engineer.
6/15/2018

DOCUMENT A00816

RUMBLE STRIP DETAILS



NOTES:

1. NOT TO SCALE. SOME LINE WORK EXAGGERATED FOR CLARITY.
2. SEE PLANS FOR LOCATION(S) AND START AND END STATIONS FOR ALL RUMBLE STRIP INSTALLATIONS.
3. HIGH POINT OF SINUSOIDAL RUMBLE STRIP LOCATED $\frac{1}{16}$" BELOW PAVEMENT SURFACE.

DESIGN OF CURVE PROFILE FOR SINUSOIDAL RUMBLE STRIP									
POINT	A	B	C	D	E	F	G	H	I
DEPTH FROM PAVEMENT SURFACE (IN.)	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{7}{32}$	$\frac{11}{32}$	$\frac{3}{8}$	$\frac{11}{32}$	$\frac{7}{32}$	$\frac{1}{8}$	$\frac{1}{16}$
DISTANCE FROM HIGH POINT "A" (IN.)	0	1.75	3.5	5.25	7	8.75	10.5	12.25	14

massDOT Massachusetts Department of Transportation Highway Division

TRAFFIC & SAFETY STANDARDS
SECTION 860

RUMBLE STRIP DETAILS

DATE OF ISSUE: 2020

DRAWING NUMBER: XXX.X.X

DOCUMENT A00820

Massachusetts Department of Transportation
Conditions of Custody

REQUEST FOR RELEASE OF MASSDOT AUTOCAD FILES FORM
(Only to be used following award of contract)

City/Town: PROVINCETOWN Project File Number: 608744

Contract Number: 136412

Project Description: **Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street**

All AutoCAD files are provided solely as a courtesy to facilitate public access to information. MassDOT attempts to provide current and accurate information but cannot guarantee so. MassDOT provides such documents, files or other data "as is" without any warranty of any kind, either expressed or implied, including but not limited to, accuracy, reliability, omissions, completeness and currentness. The Commonwealth of Massachusetts and its Consultants shall not be liable for any claim for damages, including lost profits or other consequential, exemplary, incidental, indirect or special damages, relating in any way to the documents, files or other data accessible from this file, including, but not limited to, claims arising out of or related to electronic access or transmission of data or viruses. Because data stored on electronic media can deteriorate undetected or be modified without our knowledge, MassDOT cannot be held liable for its completeness or correctness. MassDOT makes no representation as to the compatibility of these files beyond the version of the stated CAD software.

By signing this form, I agree that it shall be my responsibility to reconcile this electronic data with the conformed contract documents, and that only the conformed contract documents shall be regarded as legal documents for this Project. I understand that this authorization does not give me the right to distribute the files. I agree to the terms above and wish to receive the AutoCAD files.

This signed form shall be emailed to the Highway Design Engineer at the MassDOT -Highway Division at the following email address:

DOTHighwayDesign@dot.state.ma.us
Attn: AutoCAD Files

Name of person requesting AutoCAD files: _____

Affiliation/Company: _____

Address: _____

_____

Telephone number: _____

Email address: _____

Signature/Date: _____

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DOCUMENT A00830

ARMY CORPS OF ENGINEERS

Self - Notification Verification

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July 30, 2025

U.S. Army Corps of Engineers
New England District
696 Virginia Road,
Concord, MA 01741

RE: Self-Verification Notification
Route 6 and Shank Painter Rd Road and Drainage Reconstruction Project
Provincetown, MA

Dear New England District Regulatory Division,

On behalf of the Town of Provincetown, Apex Companies, LLC (Apex) is submitting this Self-Verification Notification (SVN) for the proposed Route 6 and Shank Painter Rd Road and Drainage Reconstruction project.

Project Overview

Shank Painter Road provides access between Route 6 and downtown Provincetown. Presently, the four-lane divided Route 6 corridor creates a barrier at the northern limit of Shank Painter Road making it challenging for bicyclists and pedestrians to reach popular recreational destinations along Route 6 such as the Cape Cod National Seashore, Herring Cove Beach, the Shank Painter Ponds and several trails. In addition, the existing sidewalks on Shank Painter Road are inadequate for safe pedestrian traffic between Route 6 and downtown Provincetown.

Shank Painter Road and its surrounding properties regularly experience local flooding issues due to the small existing drainage network providing only minimal collection and conveyance. Most notably, the Town has concerns regarding the significant flooding occurring on Court Street, a mixed commercial and residential street that intersects with Shank Painter Road. The area has been experiencing flooding depths greater than 6 inches of standing water occur during intense storms, and greater depths have been found under modeled severe storms. This localized flooding constantly impacts surrounding property owners and traffic.

To improve pedestrian and bicycle connections, Apex is proposing a combination of shared-use paths, sidewalks, and narrowed vehicular travel lanes along Route 6 and Shank Painter Road. At the Route 6 and Shank Painter Road intersection, a roundabout is proposed to efficiently process and calm motorist traffic as it enters this final section of Route 6 and Cape Cod.

Apex is proposing a new stormwater management system along Shank Painter Road and Route 6 that combines the installation of new catch basins, conveyance piping, subsurface infiltration chambers, and a new detention pond and sedimentation forebay to provide improved drainage management. Additionally, Apex proposes to install a stormwater pump station on Court Street, which will allow for mitigation of the flooding within site restrictions.

Resource Areas

The drainage improvements on Shank Painter Road and Court Street involve limited disturbance to two vegetated wetland resource areas: a Vegetated Wetland at the corner of Shank Painter Road and Court Street, and a Vegetated Wetland at the southern end of Shank Painter Road near Bradford Street.

- Work in the Court Street vegetated wetland resource area is required to install two new drainage structures: Outfall 212-OF along the Shank Painter Road side of the vegetated wetland, and the Court Street wetland overflow structure on the Court Street side of the vegetated wetland.

  - Work includes installation of a retaining wall, installation of rip-rap for energy dissipation, installation of the overflow structure, and regrading around the structures.
  - The retaining wall and structures will be installed outside of the vegetated wetland area. Work occurring within the vegetated wetlands includes regrading to connect the completed headwall and outfall pipe to the existing surface. Regrading will result in a small expansion of the vegetated wetland area at Outfall 212-OF.
  - A portion of the rip rap pad for Outfall 212-OF will be installed within the existing vegetated wetland area. This loss in IVW will be replicated immediately adjacent to the rip rap pad. Replication was conservatively estimated as areas below the 6-foot contour.
- Work in the South Shank Painter vegetated wetland resource area is required to install the new drainage outfall 416-OF.
  - Work includes installing a flared end pipe, riprap for energy dissipation, and regrading around the outfall. The impact area was measured as the area between the erosion controls and the wetland flags.
  - The flared end outfall will be installed outside of the vegetated wetland area.
  - The rip rap pad will overlap with the existing vegetated wetland area. Regrading around the outfall will cut back the grade around the outfall. This allows for vegetated wetland replication on both sides of the outfall. The area of vegetated wetland replication was conservatively measured as the area of vegetated wetland added below the proposed 5 foot contour line.

All temporary vegetated wetland impact areas and vegetated wetland replication areas will be restored by reusing the existing hydric soils as topsoil and reseeding with a New England Conservation Wetland Wet Seed Mix (Wetmix).

An electronic copy of this SVN and the following list of attachments shall be provided to the USACE New England District.

- Appendix A: Self-Verification Notification
- Appendix B: Locus Map and Resource Figures
- Appendix C: Design Plans
- Appendix D: Wildlife & Habitat Information
- Appendix E: Historical Commission Notifications

Sincerely,

Maria George

Apex Companies, LLC
Maria George, PE
Senior Project Engineer
O: 617.657.0952
E: maria.george@apexcos.com

CC:
Jim Vincent, Public Works Director, Town of Provincetown
Braden Witt, DPW Senior Project Manager, Town of Provincetown
Melyssa Nickerson, Conservation Agent, Town of Provincetown
Benny Hung, PE, Senior Project Manager, Apex Companies
Ryan Paul, PE, CFM, Senior Project Manager, Apex Companies
Melissa Lenker, MassDOT

Appendix A

Self-Verification Notification Form

U.S. Army Corps of Engineers (USACE)

SELF-VERIFICATION NOTIFICATION (SVN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose This information will be used in evaluating activities under Self-Verification procedures within Massachusetts.

Routine Uses Routine uses will include: (1) Documenting compliance with the terms and conditions of the General Permit (GP) for activities that may require authorization pursuant to one or more of USACE's Regulatory authorities. (2) Records may be referred to other Federal, State, and local agencies for evaluation and enforcement purposes.

Disclosure Failure to fully comply and abide by the GP terms and conditions prior to commencing work and after completion project may result in formal enforcement action, up to and including monetary penalties and/or legal action, pursuant to 33 CFR Part 326.

Instructions The permittee must complete ALL required sections of this document before commencing USACE-regulated activities. A copy of this completed SVN must be kept on site during construction and be made available for review by USACE and other Federal, State, & Local regulatory authorities at any time. Within 30 days of initiating project construction, the permittee shall submit the completed SVN to USACE. The SVN shall be submitted to USACE as **ONE signed document** that includes project plans and documentation that supports each field (e.g., emails, letters, description, phone calls, surveys). Electronic submissions to the following address are strongly preferred: cenae-r-ma-sv@usace.army.mil. The email subject line shall contain the following: GP #, SVN, City/Town, and date submitted.

(ITEMS 1 THRU 3 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED

APPLICANT AND AGENT INFORMATION

4. APPLICANT'S NAME	7. AGENT'S ADDRESS:
First - Jim Middle - Last - Vincent	First - Maria Middle - Last - George
Company - Provincetown Department of Public Works	Company - Apex Companies, LLC
E-mail Address - jvincent@provincetown-ma.gov	E-mail Address - maria.george@apexcos.com
5. APPLICANT'S ADDRESS:	8. AGENT'S ADDRESS:
Address- 2 Mayflower Street	Address- 18 Commerce Way Suite 2000
City - Provincetown State - MA Zip - 02657 Country - USA	City - Woburn State - MA Zip - 01801 Country - U
6. APPLICANT'S PHONE NOs. w/AREA CODE	9. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax
508-487-7060 508-487-4675	617-657-0952

NAME, LOCATION, AND DESCRIPTION OF PROJECT SITE

10. PROJECT NAME OR TITLE
Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction

11. FILE NUMBER(S) OF PREVIOUS USACE ACTIONS ON THE SITE (if applicable)	12. NAME OF WATERBODY
N/A	N/A - Wetlands off of Shank Painter Pond
13. PROJECT COORDINATES (in decimal degrees)	14. PROJECT STREET ADDRESS (if applicable)
Latitude: ◦N Longitude: ◦W	Address Route 6, Shank Painter Rd, and Court St
42.051423 70.195455	City - Provincetown State - MA Zip - 02169

ACTIVITY TYPE, PROJECT IMPACTS, AVOIDANCE & MINIMIZATION

15. GENERAL PERMIT ACTIVITIES (CHECK ALL THAT APPLY)

1 ☐	6 ☐	11 ☐	16 ☐	21 ☐
2 ☐	7 ☐	12 ☐	17 ☐	22 ☐
3 ☐	8 ☐	13 ☐	18 ☐	23 ☑
4 ☐	9 ☐	14 ☐	19 ☐	24 ☐
5 ☐	10 ☐	15 ☐	20 ☐	25 ☐

16. SUMMARY OF PROJECT IMPACTS (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration
		37.7 CY <Cut>	Permanent
44.8 SF			Permanent
1020 SF			Temporary

17. PROJECT PLANS (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE ITEMS ARE COMPLETE) (*see instructions*)

- [x] a. Plans shall at least contain the following: Vicinity Map, Plan View, and Typical Cross Section View of the proposed activity.
- [x] b. All direct, indirect and secondary impacts from USACE regulated activities are shown on the project plans.
- [x] c. The size of the impact area for each activity (acre, square feet, linear feet) are shown on the project plans.
- [ ] d. For discharges of fill material (§404), the volume of fill material is identified on the project plans.
- [x] e. The duration of each impact, permanent or temporary (X days), is identified on the project plans.
- [ ] f. Do activities with permanent impacts result in the loss of waters? If so, this is identified on the project plans.
- [x] g. All aquatic resources in the vicinity of the USACE regulated activities are delineated on the project plans.

18. AVOIDANCE & MINIMIZATION (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE CRITERIA ARE MET) (*see instructions*)

- [x] a. The project has been designed to avoid and minimize impacts to aquatic resources.
- [x] b. The footprint of activities in waters of the U.S. has been reduced to only what is necessary to achieve the overall project purpose.
- [x] c. All practicable measures have been taken to avoid and minimize impacts to aquatic resources through construction techniques and site access (e.g., Best Management Practices, Time of Year Restrictions).
- [x] d. All temporary impacts from USACE regulated activities will be restored upon completion of construction and the project area will be returned to pre-construction contours and conditions.

COMPLIANCE WITH FEDERAL REGULATIONS & SUPPLEMENTAL INFORMATION

19. DUE DILIGENCE (*see instructions*)

Complete the entries below to document compliance with the following Federal requirements. Construction may NOT begin if a PCN is/may be required, and you must contact USACE to determine permitting requirements. Documentation that demonstrates how the activity complies with each field below shall be submitted to the USACE as noted in the instructions block. See each General Condition (GC) in the GP for how to comply with each requirement.

a. State Historic Preservation Officer	Per Appendix A, SHPO was notified and they did not respond with concerns within 30 days.
b. Massachusetts BUAR	Per Appendix A, BUAR was notified and they did not respond with concerns within 30 days.
c. Tribal Historic Preservation Officers	The Tribe(s) were notified and they didn't respond with concerns within 30 days.
d. Endangered Species Act - NOAA	The activity is not located within the ESA-listed Species Range.
e. Endangered Species Act - USFWS	Another Federal action agency reached a no effect determination.
f. Northern Long Eared Bat (ESA)	NLAA determination reached with the Rangewide D-Key. See Instructions below.*
g. Essential Fish Habitat	The project footprint does not contain EFH (see EFH definition in the MA GP).
h. Wild & Scenic Rivers	There are no WSR's within 0.25 miles of the project area.
i. 401 Water Quality Certification 401	The activity qualifies under the general 401 WQC for the 2023 MA GPs.
	401 WQC/OOC File Number: SE058-0763 OOC issued: 401 issued: N/A
j. Section 408 Permission	Not Required per GC 15a-f, no Federal Projects are within the project vicinity.
k. Coastal Zone	Per GC 9, the project has CZM federal consistency concurrence.
l. Construction Mats	N/A, the activity does not require the installation of construction mats.
m.Time of Year Restrictions	The project complies with TOY Restrictions in GC 20.
n. Vernal Pools	Per GC 28, the project is not located in a vernal pool.
o. Sediment & Erosion Controls	Per GC 25, the activity uses BMPs to avoid/minimize sedimentation & erosion.
p. Stream/Wetland Crossings	The activity does not require a stream/wetland crossing.

20. AQUACULTURE ACTIVITIES - GP 18 (*see instructions*)

- [ ] a. If required, an Aquaculture Certification from the Massachusetts Division of Marine Fisheries was obtained prior to commencing work.
- [ ] b. Coordination with the U.S. Coast Guard pursuant to Private Aids to Navigation has occurred prior to commencing work.
- [ ] c. If required, a MEPA Certificate was obtained from the Massachusetts Environmental Protection Agency prior to commencing work. Not Required
- [ ] d. The prospective permittee contacted local authorities (e.g. harbormaster, select board, shellfish constable) for authorization of their facility prior to commencing work.

21. ADDITIONAL INFORMATION/ATTACHMENTS (*see instructions*)

- [x] a. The project plans are enclosed in this SVN submittal (see block 17).
- [ ] b. The activity IS NOT funded through the Bipartisan Infrastructure Bill (also known as the Infrastructure Investment and Jobs Act).
- [x] c. All required state, local and federal approvals were acquired prior to starting construction in USACE jurisdiction.
- [x] d. After construction of the activity is completed, a complete Certificate of Compliance will be submitted to USACE.

22. IS THERE ANOTHER LEAD FEDERAL AGENCY:

[x] YES [ ] NO FHWA

23. STATEMENT OF AUTHORIZATION *(see instructions)*

I certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
	7/30/25	Maria George	7/30/25

24. SIGNATURES *(see instructions)*

I hereby certify that the information in this Self-Verification Notification is complete and accurate. As the applicant or their duly authorized agent, I certify the activity was completed in accordance with the terms and conditions of the GP. This includes all applicable terms, general conditions, and activity-specific GP criteria. I agree to allow the duly authorized representatives of the Corps of Engineers Regulatory Program and other regulatory or advisory agencies to enter upon the premises of the project site at reasonable times to evaluate inspect and photograph site conditions. This consent to enter the property is superior to, takes precedence over, and waives any communication to the contrary. For example, if the property is posted as "no trespassing" this consent specifically supersedes and waives that prohibition and grants permission to enter the property despite such posting.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
	7/30/25	Maria George	7/30/25

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army
General Permit (GP) Self-Verification

Blocks 1 through 3. To be completed by the Corps of Engineers.

Block 4. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the self-verification, please attach a sheet of paper with the necessary information marked Block 4.

Block 5. Address of Applicant. Please provide the full address of the party or parties responsible for the self-verification. If more space is needed, attach an extra sheet of paper marked Block 5.

Block 6. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 7 through 9. To be completed, if you choose to have an agent.

Block 7. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 8 and 9. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 10. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 11. File Number(s) of Previous USACE Actions on the Site Please provide any known USACE file number. If the activity does not have a known USACE file number, you may state N/A.

Block 12. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 13. Proposed Activity Coordinates. Please enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 13.

Block 14. Proposed Activity Street Address. If the proposed activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. General Permit Activity Type. Please select all GP activity types that apply to the proposed activity. A list of GP activity types can be found in Section **III** of the GP.

Block 16. Summary of Project Impacts. Please provide ALL proposed impacts, both temporary and permanent in duration, that are located in Waters of the United States. The area of impact shall be provided in square feet (SF). When applicable, impacts that result in conversion of stream bank or shoreline must also be identified in linear feet (LF). Dredging or the discharge of dredged or fill material shall also include the volume, cubic yards (CY), of material removed from or placed into Waters of the U.S. If more entries are required, please attach a table matching the desired format in Block 16.

Block 17. Project Plans. Please verify that items a-g are included in the project plans. Three types of illustrations are necessary to properly depict the proposed work. These illustrations or drawings are identified as a Vicinity Map, a Plan View (Aerial view) and a Cross Section Map. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings (longitudinal profile) should also be included. Plans must accurately depict the existing conditions and all aspects of the proposed activity located in waters of the U.S. Please submit one copy of all drawings formatted to print on 8½ x 11 inch or 11 x 17 inch plain white paper. Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be certified engineering sheets; they should be clear, accurate, contain all necessary information, and depict all proposed work. Each submission must also include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by USACE.

Block 18. Avoidance & Minimization. Please verify that items a-d have been implemented for the proposed activity.

Block 19. Due Diligence. Please complete all the fields and submit documentation to USACE to demonstrate compliance with the above requirements. This Documentation may include emails, letters, meeting notes, phone call log, project narrative, project plans, a species list from the NOAA Section 7 Mapper, a completed copy of the IPAC determination keys, etc. Documentation should be limited to what is necessary to demonstrate how the proposed activity meets each requirement. Refer to the MA GP, Appendix A, for specific guidance on the identification of previously identified historic properties and previously unidentified historic properties. Endangered Species: *The applicant must be designated as the non-federal representative for the purposes of Section 7 consultation to select the Rangewide D-Key options. Otherwise, the applicant shall select the following option when IPAC indicates the NLEB is present: "The activity IS located within the NLEB Species Range (PCN Required)."

Block 20. Aquaculture Activities. Please verify that items a-d have been obtained or completed prior to commencing work in waters of the U.S.

Block 21. Additional Information/Attachments. Please verify that items a-d have been completed prior to commencing work in waters of the U.S.

Block 22. Lead Federal Agency. Please identify if there is another lead federal agency involved with the proposed activity. Enter the lead federal agency name (e.g., the Federal Emergency Management Agency, FEMA) and the agency's designated person of contact for the activity.

Block 23. Statement of Authorization. The applicant shall sign this section for all activities. If an agent is to be employed, the agent shall sign this section.

Block 24. Signatures. The SVN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the SVN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the SVN possesses the requisite property rights to undertake the GP activity.

Appendix B

Locus Map and Resource Figures

A00830 - 11

Limit of Work

Clapps Pond

Shank Painter Pond

Court Street Vegetated Wetland

South Shank Painter Vegetated Wetland

Town Hill

Provincetown Schools

JEROME SMITH RD

ALDEN ST

WINSLOW ST

JEROME RD

PROVINCE RD

SILVA LN

SHIPS WAY RD

COURT ST

WINTHROP ST

SHANK PAINTER RD

CARVER ST

BRADFORD ST

CENTRAL ST

RACE RD

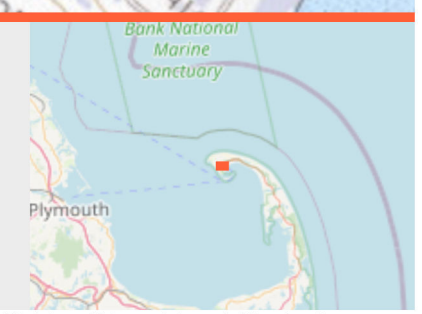
6

N

ENVIRONMENTAL PARTNERS
— An Apex Company —

Figure 1
USGS Locus Map
Provincetown, MA
3/27/2024

0 500 1,000 2,000
Feet



I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

Disclaimer: This map is intended for planning purposes

Proposal No. 608744-136412

Limit of Work

FEMA Flood Zone

AE - 1% Annual Chance Flood Hazard

VE - 1% Annual Chance Flood Hazard

X - 0.2% Annual Chance Flood Hazard

Court Street
Vegetated Wetland

South Shank Painter
Vegetated Wetland

Route 6
Route 6
Route 6
Route 6
Jerome Smith Rd
Saint Peters Cemetery
Provincetown High School
Cumberland Farms
Province Rd
Shank Painter Rd
Captain Bertie Way
Veterans Elementary School
Winslow St
Ships Way Rd
Prince St
Provincetown Cemetery No. 1
6A
Court St
Winthrop St
Commercial St
Race Rd
Franklin
Pleasant St
Conant St
Clapps Pond
Shank Painter Pond
35 ft
52 ft
58 ft
6
6
6

N

Figure 2

FEMA Flood Zones

Provincetown, MA

3/27/2024

0 500 1,000 2,000

Feet

ENVIRONMENTAL PARTNERS

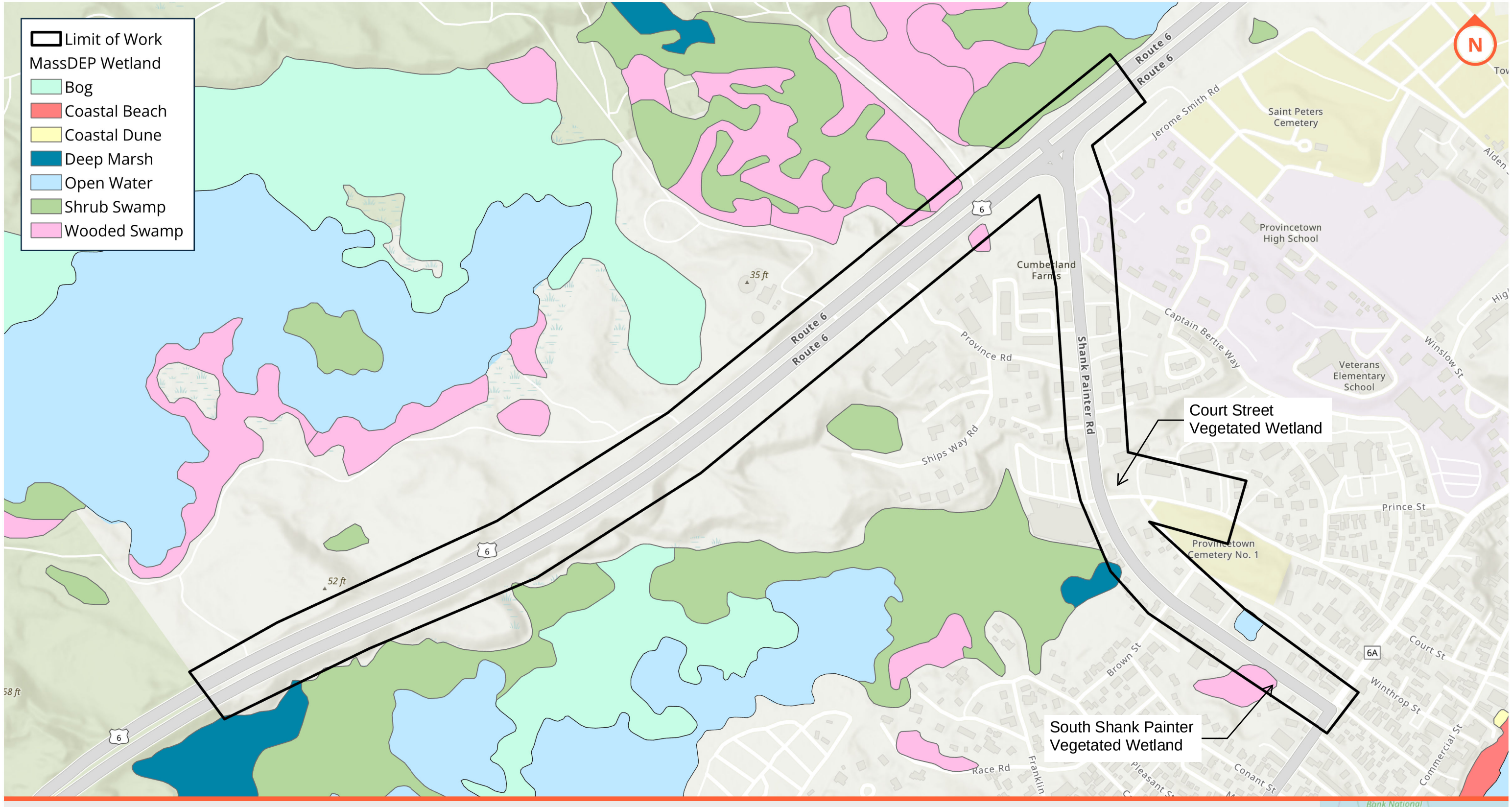
— An Apex Company —

Bank National Marine Sanctuary

Plymouth

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Disclaimer: This map is intended for planning purposes



ENVIRONMENTAL PARTNERS
— An Apex Company —

Figure 3
MassDEP Wetlands
Provincetown, MA
3/27/2024

0 500 1,000 2,000
Feet

I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

Disclaimer: This map is intended for planning purposes

Limit of Work
NHESP Potential Vernal Pools
NHESP Priority Habitats of Rare Species
NHESP Estimated Habitats of Rare Wildlife

Court Street
Vegetated Wetland

South Shank Painter
Vegetated Wetland

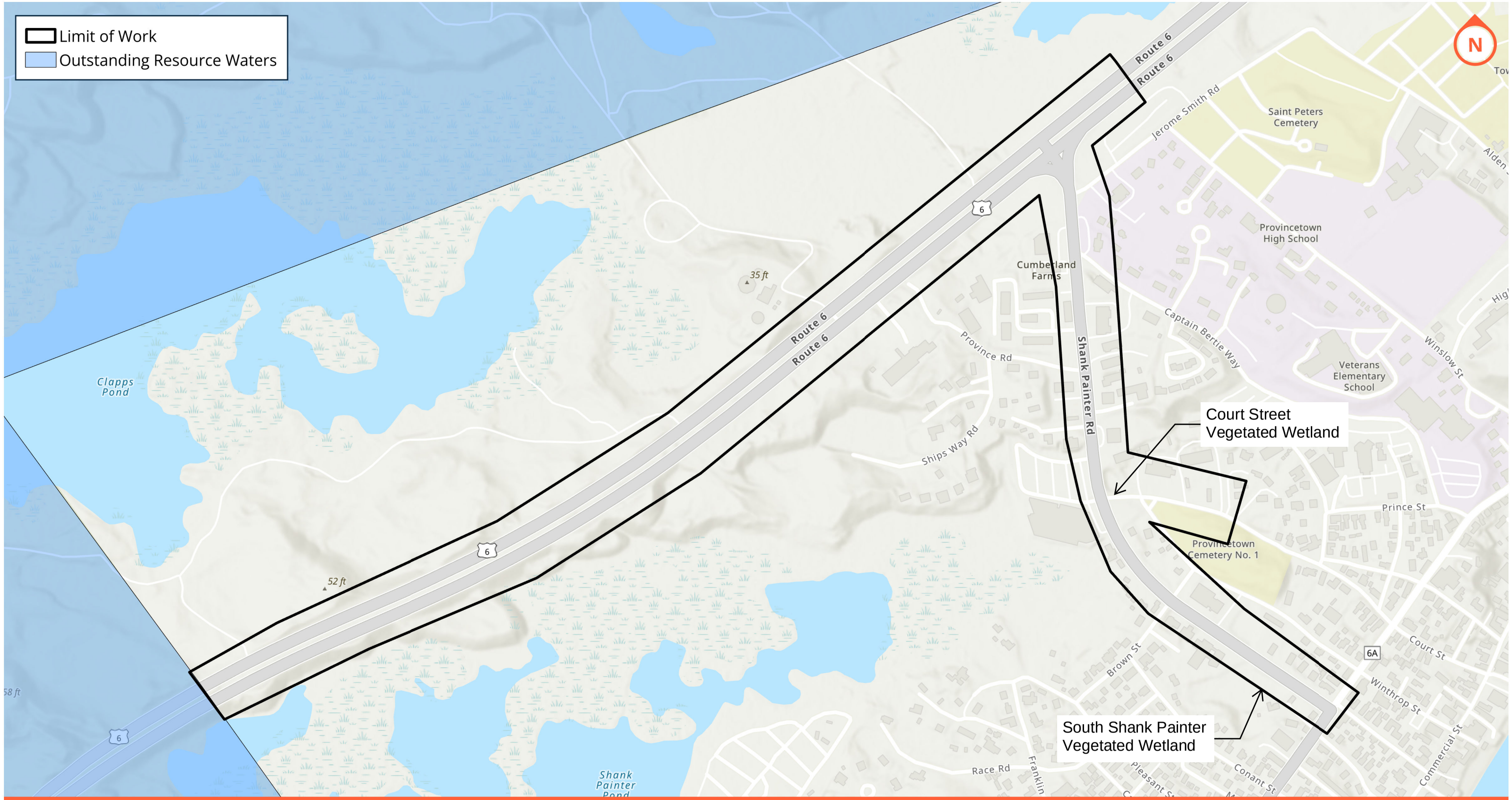
Figure 4
NHESP Habitats and Vernal Pools
Provincetown, MA
3/27/2024

0 500 1,000 2,000
Feet

ENVIRONMENTAL PARTNERS
— An Apex Company —

I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

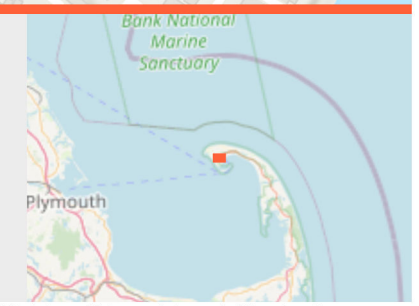
Disclaimer: This map is intended for planning purposes



ENVIRONMENTAL PARTNERS
— An Apex Company —

Figure 5
Outstanding Resource Waters
Provincetown, MA
3/27/2024

0 500 1,000 2,000 Feet



I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

Disclaimer: This map is intended for planning purposes

Appendix C

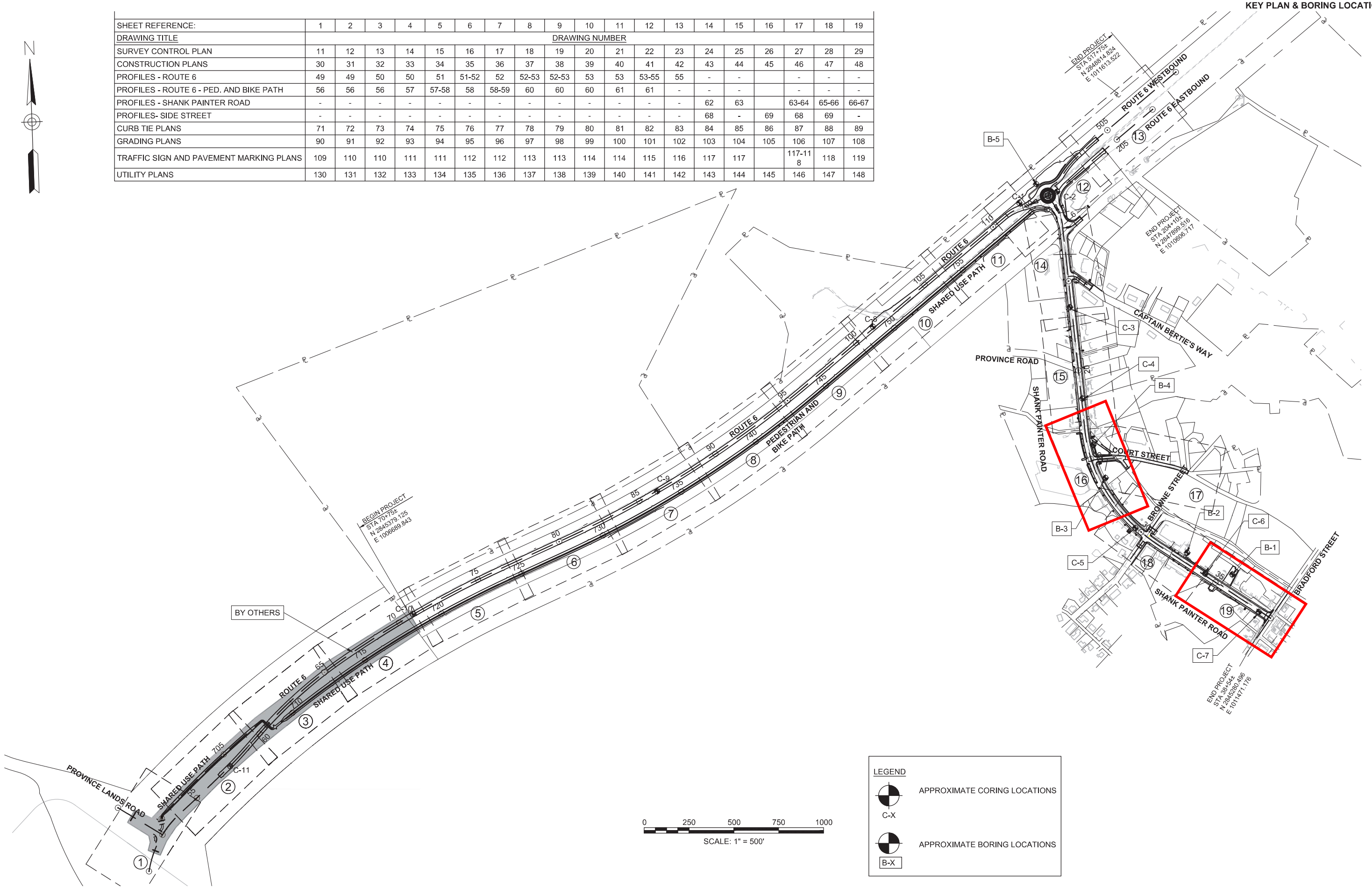
Design Plans

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	003	280
PROJECT FILE NO.	608744		

KEY PLAN & BORING LOCATIONS

SHEET REFERENCE:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
DRAWING TITLE	DRAWING NUMBER																		
SURVEY CONTROL PLAN	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
CONSTRUCTION PLANS	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
PROFILES - ROUTE 6	49	49	50	50	51	51-52	52	52-53	52-53	53	53	53-55	55	-	-		-	-	-
PROFILES - ROUTE 6 - PED. AND BIKE PATH	56	56	56	57	57-58	58	58-59	60	60	60	61	61	-	-	-		-	-	-
PROFILES - SHANK PAINTER ROAD	-	-	-	-	-	-	-	-	-	-	-	-	-	62	63		63-64	65-66	66-67
PROFILES- SIDE STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	68	-	69	68	69	-
CURB TIE PLANS	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
GRADING PLANS	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
TRAFFIC SIGN AND PAVEMENT MARKING PLANS	109	110	110	111	111	112	112	113	113	114	114	115	116	117	117		117-118	118	119
UTILITY PLANS	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148



A00830 - 17

Proposal No. 608744-136412

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	145	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 16

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

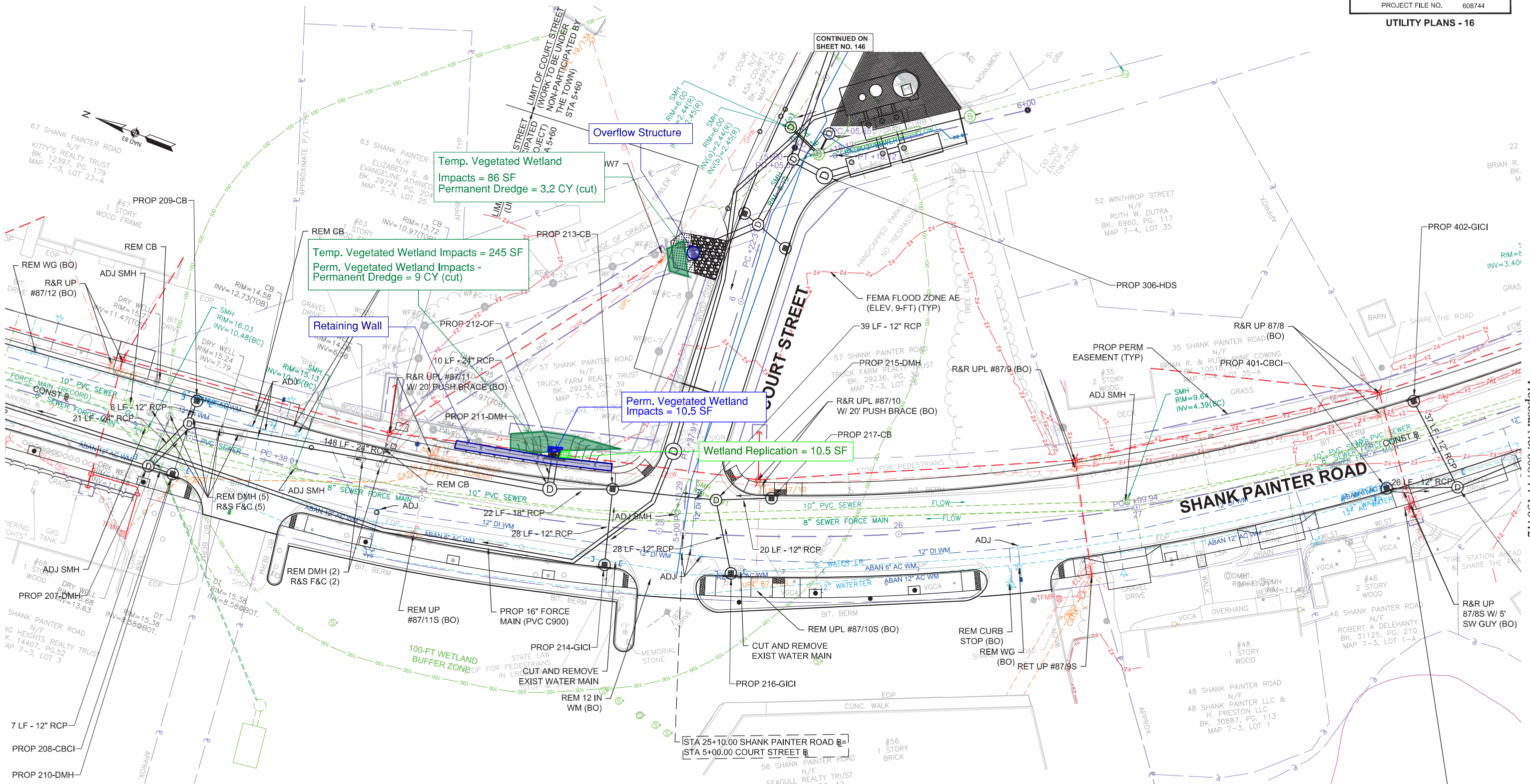
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW



NOTES:

1. ALL STATIONS AND OFFSETS ARE MEASURED AT THE CENTER OF STRUCTURES.
2. ALL RIM AND INVERT INFORMATION IS BASED OFF TOPOGRAPHIC SURVEY. CONTRACTOR TO FIELD VERIFY ALL INFORMATION AND REPORT ANY INCONSISTENCIES TO THE ENGINEER FOR RESOLUTION.
3. SANITARY STRUCTURES (SMH) BOLTED OR SEALED SHUT SHALL BE REPORTED TO THE TOWN PRIOR TO REMOVING THE COVERS AS NEEDED TO PERFORM ADJACENT ROADWAY WORK.
4. ALL DRAINAGE STRUCTURES AND PIPES PROPOSED TO BE RETAINED AND/OR UTILIZED WITHIN THE PROJECT LIMITS AND AS DIRECTED BY THE ENGINEER SHALL BE CLEANED OF ALL SEDIMENT AND DEBRIS TO THE SATISFACTION OF THE ENGINEER.
5. THE EXISTING ABANDONED WATERMAIN SHALL BE CUT AND PLUGGED WHEN CONFLICTS WITH THE PROPOSED DRAINAGE.
6. ALL PROPOSED WATER GATES TO BE CONSTRUCTED BY OTHERS SHALL BE ADJUSTED TO FINISHED GRADE FOR FINAL PAVING.

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

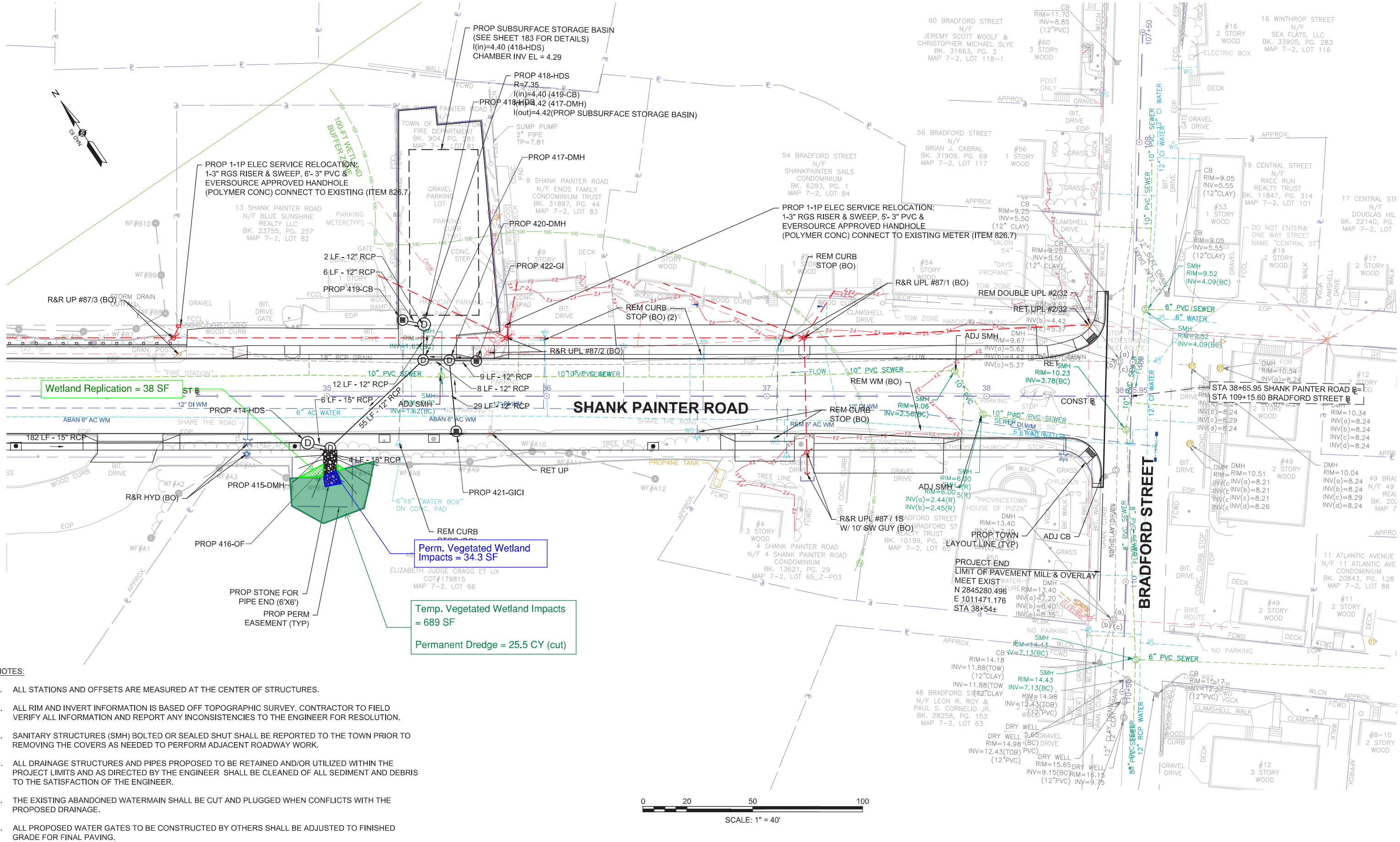
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

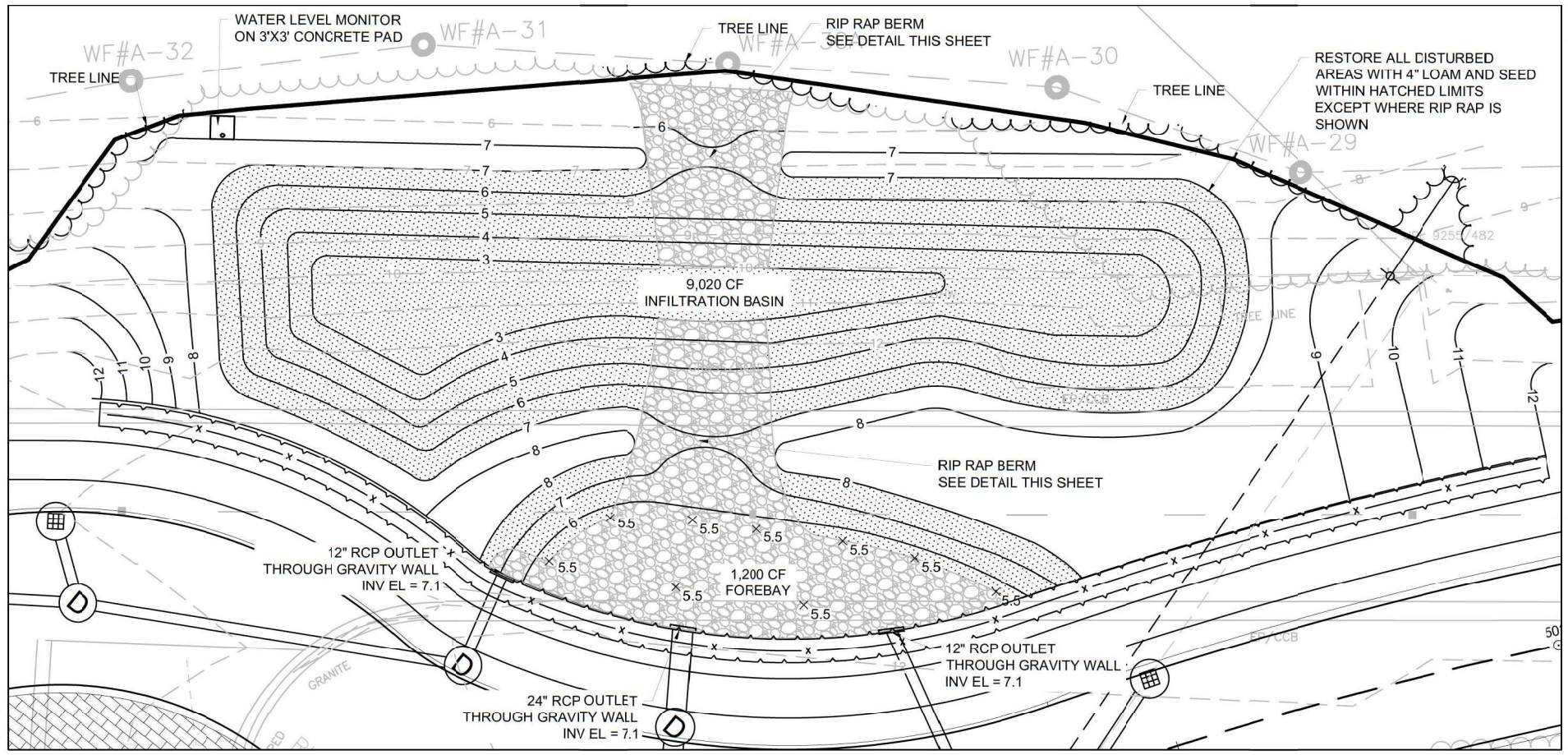
SEE BELOW


PROP SUBSURFACE STORAGE BASIN
(SEE SHEET 183 FOR DETAILS)
I(in)=4.40 (418-HDS)
CHAMBER INV EL = 4.29
PROP 418-HDS
R=7.35
I(in)=4.40 (419-CB)
PROP 418-DMH
I(in)=4.42 (417-DMH)
I(out)=4.42(PROP SUBSURFACE STORAGE BASIN)
PROP 417-DMH
PROP 1-1P ELEC SERVICE RELOCATION:
1-3" RGS RISER & SWEEP, 6'- 3" PVC &
EVERSOURCE APPROVED HANDHOLE
(POLYMER CONC) CONNECT TO EXISTING (ITEM 826.7)
PROP 420-DMH
PROP 422-GI
2 LF - 12" RCP
6 LF - 12" RCP
PROP 419-CB
R&R UP #87/3 (BO)
R&R UPL #87/2 (BO)
9 LF - 12" RCP
8 LF - 12" RCP
29 LF - 12" RCP
12 LF - 12" RCP
6 LF - 15" RCP
55 LF - 12" RCP
4 LF - 18" RCP
182 LF - 15" RCP
PROP 414-HDS
PROP 415-DMH
PROP 416-OF
R&R HYD (BO)
RET UP
PROP 421-GICI
REM CURB STOP (BO)
REM CURB STOP (BO) (2)
REM WM (BO)
R&R UPL #87 / 1S
W/ 10' SW GUY (BO)
PROP 1-1P ELEC SERVICE RELOCATION:
1-3" RGS RISER & SWEEP, 5'- 3" PVC &
EVERSOURCE APPROVED HANDHOLE
(POLYMER CONC) CONNECT TO EXISTING METER (ITEM 826.7)
R&R UPL #87/1 (BO)
REM DOUBLE UPL #2/32
RET UPL #2/32
ADJ SMH
ADJ CB
PROP TOWN
LAYOUT LINE (TYP)
PROJECT END
LIMIT OF PAVEMENT MILL & OVERLAY
MEET EXIST
N 2845280.496
E 1011471.176
STA 38+54±
SHANK PAINTER ROAD
BRADFORD STREET
STA 38+65.95 SHANK PAINTER ROAD
STA 109+15.60 BRADFORD STREET
Wetland Replication = 38 SF
Perm. Vegetated Wetland
Impacts = 34.3 SF
Temp. Vegetated Wetland Impacts
= 689 SF
Permanent Dredge = 25.5 CY (cut)
100-FT WETLAND
BUFFER ZONE
60 BRADFORD STREET
N/F
JEREMY SCOTT WOOLF &
CHRISTOPHER MICHAEL SLYE
BK. 31663, PG. 3
MAP 7-2, LOT 118-1
56 BRADFORD STREET
N/F
BRIAN J. CABRAL
BK. 31909, PG. 69
MAP 7-2, LOT 117
54 BRADFORD STREET
N/F
SHANKPAINTER SAILS
CONDOMINIUM
BK. 6293, PG. 1
MAP 7-2, LOT 84
48 BRADFORD STREET
N/F LEON R. ROY &
PAUL S. CORNELIO JR.
BK. 28258, PG. 153
MAP 7-2, LOT 63
13 SHANK PAINTER ROAD
N/F BLUE SUNSHINE
REALTY LLC
BK. 23755, PG. 257
MAP 7-2, LOT 82
9 SHANK PAINTER ROAD
N/F ENOS FAMILY
CONDOMINIUM TRUST
BK. 31897, PG. 44
MAP 7-2, LOT 83
4 SHANK PAINTER ROAD
N/F 4 SHANK PAINTER ROAD
CONDOMINIUM
BK. 13621, PG. 29
MAP 7-2, LOT 65_Z-P03
ELIZABETH JUDGE CRAGG ET UX
COT#179815
MAP 7-2, LOT 66
TOWN OF PROVINCETOWN
FIRE DEPARTMENT
BK. 904, PG. 281
MAP 7-2, LOT 81
16 WINTHROP STREET
N/F
SEA FLATS, LLC
BK. 33905, PG. 283
MAP 7-2, LOT 116
19 CENTRAL STREET
N/F
RACE RUN
REALTY TRUST
BK. 11847, PG. 314
MAP 7-2, LOT 101
17 CENTRAL STREET
N/F
DOUGLAS HIL
BK. 22140, PG.
MAP 7-2, LOT
11 ATLANTIC AVENUE
N/F 11 ATLANTIC AVE
CONDOMINIUM
BK. 20843, PG. 128
MAP 7-2, LOT 86
"PROVINCETOWN
HOUSE OF PIZZA"
"PROVINCETOWN
METHODIST CHURCH"
"SALON 54"
"DAYS PROPANE"
SUMP PUMP
2" PIPE
TP=7.81
CB
RIM=11.70
INV=8.85
(12"PVC)
CB
RIM=9.05
INV=5.55
(12"CLAY)
SMH
RIM=9.52
INV=4.09(BC)
SMH
RIM=9.06
INV=2.56(BC)
SMH
RIM=14.43
INV=7.13(BC)
DMH
RIM=13.40
INV(a)=7.20
INV(b)=8.40
INV(c)=8.35
DMH
RIM=9.67
INV(a)=5.62
INV(b)=4.42
INV(c)=5.37
DMH FOR
RIM=10.34
INV(a)=8.24
INV(b)=8.24
INV(c)=8.24
INV(d)=8.24
DMH
RIM=10.51
INV(a)=8.21
INV(b)=8.21
INV(c)=8.21
INV(d)=8.21
DMH
RIM=10.04
INV(a)=8.24
INV(b)=8.24
INV(c)=8.24
INV(d)=8.24
DMH
RIM=10.23
INV=3.78(BC)
DRY WELL
RIM=14.98
INV=12.43(TOB)
(12"PVC)
DRY WELL
RIM=15.65
INV=9.15(BC)
(12"PVC)
DRY WELL
RIM=16.15
INV=9.75
ADJ SMH
RIM=8.00 5(R)
INV(a)=2.44(R)
INV(b)=2.45(R)
PROPANE TANK
ELECTRIC BOX
GAS GATE
GAS VALVE
#16
2 STORY
WOOD
#60
3 STORY
WOOD
#56
1 STORY
WOOD
#54
1 STORY
WOOD
#53
1 STORY
WOOD
#49
2 STORY
WOOD
#12
3 STORY
WOOD
#11
2 STORY
WOOD
#17
2 STORY
WOOD
#9
1 STORY
WOOD
#4
3 STORY
WOOD
#50
1 STORY
WOOD
#8-10
2 STORY
WOOD
10"+50
10"+95.95
10"+00
110+50
110+95.95
108+00
10" PVC SEWER
10" CI WATER
12" PVC SEWER
12" CI WATER
8" PVC SEWER
12" RCP WATER
6" PVC SEWER
6" WATER
10" PVC SEWER
6" WATER
12" CLAY DRAIN
12" RCP DRAIN
18" RCP DRAIN
10" PVC SEWER
10" PVC SEWER
10" PVC SEWER
10" PVC SEWER
12" DI WM
6" AC WATER
ABAN 6" AC WM
6" WATER
REM 8" AC WM
6"X6" "WATER BOX"
ON CONC. PAD
SMH
INV=1.62(BC)
ADJ SMH
INV=1.62(BC)
SMH
RIM=10.34
INV(a)=8.24
INV(b)=8.24
INV(c)=8.24
INV(d)=8.24
SMH
RIM=9.52
INV=4.09(BC)
SMH
RIM=9.52
INV=4.09(BC)
SMH
RIM=14.43
INV=7.13(BC)
SMH
RIM=14.98
INV=12.43(TOB)
(12"PVC)
CB
RIM=14.18
INV=11.88(TOW)
(12"CLAY)
INV=11.88(TOW
(12"CLAY
CB
RIM=15.17
INV=12.32
(12"PVC)
CB
RIM=9.25
INV=5.50
(12" CLAY)
CB
RIM=9.05
INV=5.55
(12"CLAY)
CB
RIM=11.70
INV=8.85
(12"PVC)
CB
RIM=9.25
INV=5.50
(12" CLAY)
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WF#A2
WF#A3
WF#A4
WF#A5
WF#A6
WF#A7
WF#A8
WF#A9
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WF#A12
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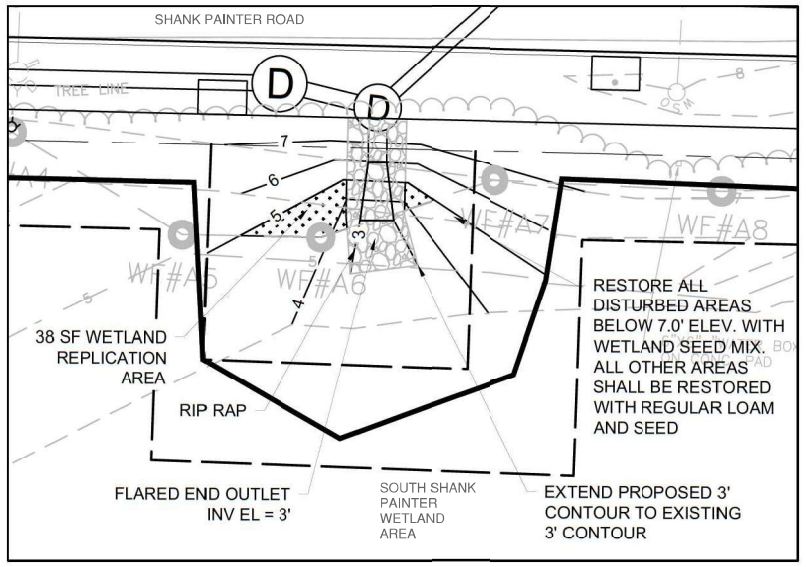
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	166	280
PROJECT FILE NO.		608744	

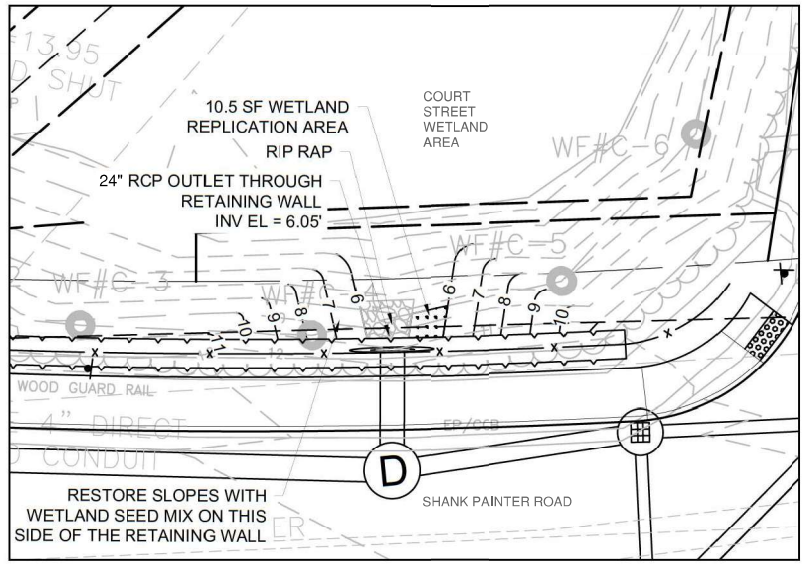
CONSTRUCTION DETAILS - 06



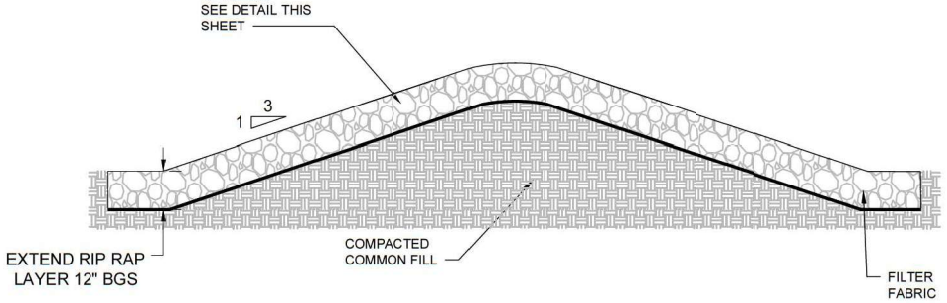
INFILTRATION BASIN GRADING PLAN
SCALE: 1"= 20'



416-OF GRADING PLAN
SCALE: 1"= 20'



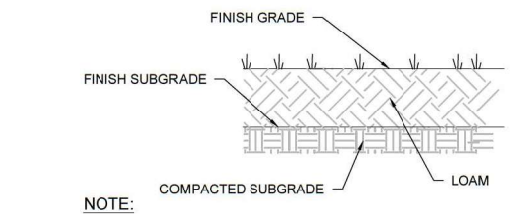
212-OF GRADING PLAN
SCALE: 1"= 20'



NOTES:

1. SEE PLAN FOR GRADING.

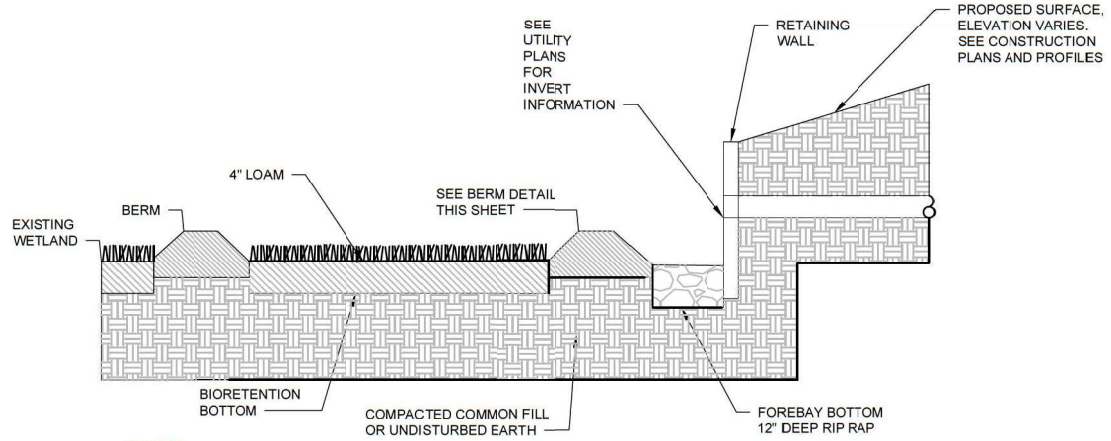
BERM DETAIL
SCALE: N.T.S.



NOTE:

1. SEED MIXTURE COMPOSITION SHALL BE CAPE COD LANDSCAPE UTILITY SEED MIX, FREE OF FERTILIZERS.
2. LOAM SHALL BE NATIVE TO CAPE COD AND OF LOW NITROGEN CONTENT.
3. INSTALL CURLEX CL EROSION CONTROL BLANKET AS MANUFACTURED BY AMERICAN EXCELSIOR COMPANY (OR APPROVED EQUAL) ON ALL LOAM AND SEEDED SLOPES 3:1 OR STEEPER.

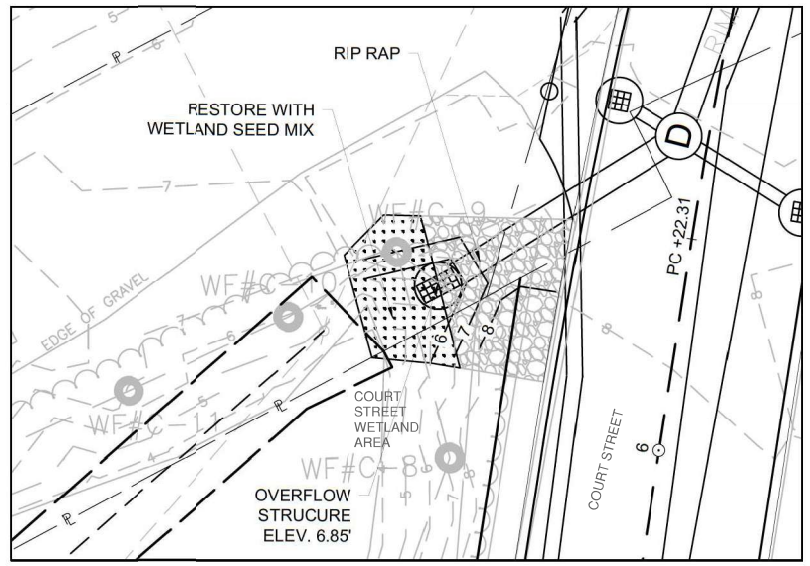
LOAM AND SEED (DISTURBED AREAS)
SCALE: N.T.S.



NOTES:

1. ALL AGGREGATE WITHIN THE STONE STORAGE BED SHALL BE CLEAN-WASHED, DEFINED AS HAVING LESS THAN 0.5% WASH LOSS, BY MASS, WHEN TESTED PER THE AASHTO T-11 WASH LOST TEST.
2. BOTTOM OF STORAGE SHOULD MAINTAIN A TWO-FOOT SEPARATION FROM SEASONAL HIGH GROUNDWATER.
3. SEE PLAN VIEW THIS SHEET FOR ELEVATION INFORMATION.

INFILTRATION BASIN
SCALE: N.T.S.



301-OVERFLOW GRADING PLAN
SCALE: 1"= 20'

Appendix D

Wildlife & Habitat Information

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 03/12/2025 19:21:02 UTC
Project code: 2023-0033794
Project Name: 608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST

Federal Nexus: yes
Federal Action Agency (if applicable): Federal Highway Administration

Subject: Federal agency coordination under the Endangered Species Act, Section 7 for '608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST'

Dear Julia Hoogeboom:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on March 12, 2025, for '608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST' (here forward, Project). This project has been assigned Project Code 2023-0033794 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements may not be complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key (DKey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid. Note that conservation measures for northern long-eared bat and tricolored bat may differ. If both bat species are present in the action area and the key suggests more conservative measures for one of the species for your Project, the Project may need to apply***

the most conservative measures in order to avoid adverse effects. If unsure which conservation measures should be applied, please contact the appropriate Ecological Services Field Office.

Determination for the Northern Long-Eared Bat and Tricolored Bat

Based on your IPaC submission and a standing analysis completed by the Service, you determined the proposed Project will have the following effect determinations:

Species	**Listing Status**	**Determination**
Northern Long-eared Bat (*Myotis septentrionalis*)	Endangered	NLAA
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

Federal agencies must consult with U.S. Fish and Wildlife Service under section 7(a)(2) of the Endangered Species Act (ESA) when an action *may affect* a listed species. Tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can *confer* under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if and when the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a NE or NLAA determination from the key to confirm that the determination is still accurate.

Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that consultation on the Action is complete for northern long-eared bat and/or tricolored bat and no further action is necessary unless either of the following occurs:

- new information reveals effects of the action that may affect the northern long-eared bat or tricolored bat in a manner or to an extent not previously considered; or,
- the identified action is subsequently modified in a manner that causes an effect to the northern long-eared bat or tricolored bat that was not considered when completing the determination key.

15-Day Review Period

As indicated above, the Service will notify you within 15 calendar days if we determine that this proposed Action does not meet the criteria for a “may affect, not likely to adversely affect” (NLAA) determination for the northern long-eared bat and/or tricolored bat. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the identified Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that we did not anticipate when developing the key. In such cases, the identified Ecological Services Field Office may request additional information to verify the effects determination reached through the Northern Long-eared Bat and Tricolored Bat DKey.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination key for the northern long-eared bat and tricolored bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Roseate Tern *Sterna dougallii dougallii* Endangered
- Rufa Red Knot *Calidris canutus rufa* Threatened

You may coordinate with our Office to determine whether the Action may affect the species and/or critical habitat listed above. Note that reinitiation of consultation would be necessary if a new species is listed or critical habitat designated that may be affected by the identified action before it is complete.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference Project Code 2023-0033794 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST

2. Description

The following description was provided for the project '608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST':

> 608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS AND RELATED WORK ON SHANK PAINTER ROAD, FROM ROUTE 6 TO BRADFORD STREET
> Work on this project consists of roadway reconstruction, sidewalk construction and reconstruction, drainage upgrades, pavement markings and signs along Shank Painter Road. Geometric improvements are proposed at the Route 6/Shank Painter Road intersection. Also included in the project is a road diet on Route 6 from Shank Painter Road to the National Seashore, which will allow for improved bicycle and pedestrian accommodation in the form of a shared use path.
> Red Knot and Roseate Tern: After consulting with the Massachusetts Natural Heritage and Endangered Species Program (NHESP), it was determined that there is no data to suggest the presence of habitat and/or individuals at this project location
> Tricolored Bat and Monarch Butterfly (both proposed): The project will not jeopardize the existence of the proposed species

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.050205000000005,-70.20437590567133,14z



DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect, but not likely to adversely affect” for a least one species covered by this determination key.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed bats or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. Is the action area wholly within Zone 2 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

3. Does the action area intersect Zone 1 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

4. Does any component of the action involve leasing, construction or operation of wind turbines? Answer 'yes' if the activities considered are conducted with the intention of gathering survey information to inform the leasing, construction, or operation of wind turbines.

   Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

   No

5. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

6. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

   Yes

7. FHWA, FRA, and FTA have completed a range-wide programmatic consultation for transportation- related actions within the range of the Indiana bat, northern long-eared bat and tricolored bat.

   Does your proposed action fall within the scope of this programmatic consultation?

   Note: If you are unsure, but your action is transportation related, please select "Yes" and use the FHWA, FRA, FTA Assisted Determination Key (FHWA DKey) in IPaC to determine if the programmatic consultation is applicable to your action. Return to this key and answer 'no' to this question if it is not.

   No

8. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

   Note: This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

   Yes

9. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

   No

10. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

    No

11. [Semantic] Is the action area located within 0.5 miles of a known bat hibernaculum?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

12. Does the action area contain any winter roosts or caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating bats?

    No

13. Does the action area contain (1) talus or (2) anthropogenic or naturally formed rock shelters or crevices in rocky outcrops, rock faces or cliffs?

    No

14. Will the action cause effects to a bridge?

    Note: Covered bridges should be considered as bridges in this question.

    No

15. Will the action result in effects to a culvert or tunnel at any time of year?

    No

16. Are trees present within 1000 feet of the action area?

    Note: If there are trees within the action area that are of a sufficient size to be potential roosts for bats answer "Yes". If unsure, additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

17. Does the action include the intentional exclusion of bats from a building or structure?

    Note: Exclusion is conducted to deny bats' entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats or tricolored bats are present, answer "Yes." Answer "No" if there are no signs of bat use in the building/structure. If unsure, contact your local Ecological Services Field Office to help assess whether northern long-eared bats or tricolored bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term "National Wildlife Control Operators Association bats"). Also see the White-Nose Syndrome Response Team's guide for bat control in structures.

    No

18. Does the action involve removal, modification, or maintenance of a human-made structure (barn, house, or other building) **known or suspected to contain roosting bats?**

    No

19. Will the action cause construction of one or more new roads open to the public?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

20. Will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic permanently or temporarily on one or more existing roads?

    Note: For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

    No

21. Will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

22. Will the proposed Action involve the creation of a new water-borne contaminant source (e.g., leachate pond, pits containing chemicals that are not NSF/ANSI 60 compliant)?

    Note: For information regarding NSF/ANSI 60 please visit https://www.nsf.org/knowledge-library/nsf-ansi-standard-60-drinking-water-treatment-chemicals-health-effects

    No

23. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

    No

24. Will the action include drilling or blasting?

    No

25. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use)?

    No

26. Will the proposed action involve the use of herbicides or other pesticides other than herbicides (e.g., fungicides, insecticides, or rodenticides)?

    No

27. Will the action include or cause activities that are reasonably certain to cause chronic or intense nighttime noise (above current levels of ambient noise in the area) in suitable summer habitat for the northern long-eared bat or tricolored bat during the active season?

    Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time. Sources of chronic or intense noise that could cause adverse effects to bats may include, but are not limited to: road traffic; trains; aircraft; industrial activities; gas compressor stations; loud music; crowds; oil and gas extraction; construction; and mining.

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

28. Does the action include, or is it reasonably certain to cause, the use of permanent or temporary artificial lighting within 1000 feet of suitable northern long-eared bat or tricolored bat roosting habitat?

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

29. Will the action cause an increase in the extent of suitable forested habitat exposed to artificial lighting?

    Yes

30. Will the action use only downward-facing, full cut-off lens lights (with same intensity or less for replacement lighting) when installing new or replacing existing permanent lights?

    Or for those transportation agencies using the Backlight, Uplight, Glare (BUG) system developed by the Illuminating Engineering Society, will all three ratings (backlight, uplight, and glare) be as close to zero as is possible, with a priority of "uplight" of 0?

    Yes

31. Will the action direct any temporary lighting away from suitable northern long-eared bat or tricolored bat roosting habitat when bats may be present?

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

32. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

    Yes

33. Will the proposed action occur exclusively in an already established and currently maintained utility right-of-way?

    No

34. Does the action include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property? See hazard tree note at the bottom of the key for text that will be added to response letters

    Note: A "hazard tree" is a tree that is an immediate threat to lives, public health and safety, or improved property.

    No

35. Does the project intersect with the 0- 9.9% forest density category?

    Automatically answered
    No

36. Does the project intersect with the 10.0- 19.9% forest density category map?

    Automatically answered
    Yes

37. Does the project intersect with the 20.0- 29.9% forest density category map?

    Automatically answered
    No

38. Does the project intersect with the 30.0- 100% forest density category map?

    Automatically answered
    No

39. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 5 acres in total extent?

    No

40. Will the proposed action result in the use of prescribed fire?

    Note: If the prescribed fire action includes other activities than application of fire (e.g., tree cutting, fire line preparation) please consider impacts from those activities within the previous representative questions in the key. This set of questions only considers impacts from flame and smoke.

    No

41. Does the action area intersect the northern long-eared bat species list area?

    Automatically answered
    Yes

42. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats?

    Automatically answered
    No

43. [Semantic] Is the action area located within 150 feet of a documented northern long-eared bat roost site?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

44. Is suitable summer habitat for the northern long-eared bat present within 1000 feet of project activities?
If unsure, answer "Yes."

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

45. Has a presence/probable absence summer bat survey targeting the northern long-eared bat following the Service's Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines been conducted within the project area?

    Yes

46. Was the survey conducted within the last 5 years?

    Yes

47. Did you coordinate with your Ecological Services Field Office (ESFO) and receive approval of the results? If NO, please contact the appropriate local ESFO before completing this determination key - you may change your answer to 'yes' only after coordinating with the ESFO and uploading survey results.

    Yes

    SUBMITTED DOCUMENTS

    - *608744_rpt_provincetown_nleb_survey_20221025.pdf https://ipac.ecosphere.fws.gov/project/VUDRYWXZDZDBJANS2M4YROTMNY/projectDocuments/121153265*

48. Did survey results demonstrate the probable absence of northern long-eared bats?

    Yes

49. Does the action area intersect the tricolored bat species list area?

    Automatically answered
    Yes

50. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

51. Has a presence/probable absence bat survey targeting the tricolored bat and following the Service's Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines been conducted within the project area?

    Yes

52. Was the presence/probable absence survey conducted within the last 5 years?

    Yes

53. Did you coordinate with your Ecological Services Field Office (ESFO) and receive approval of the results? If NO, please contact the appropriate local ESFO before completing this determination key - you may change your answer to 'yes' only after coordinating with the ESFO and uploading survey results.

    Yes

54. Did survey results demonstrate the probable absence of tricolored bats?

    Yes

55. Do you have any documents that you want to include with this submission?

    No

PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

2.7

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Julia Hoogeboom
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email julia.a.hoogeboom@dot.state.ma.us
Phone: 8574452880

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

Maria George

From: Hoogeboom, Julia A. (DOT) <Julia.A.Hoogeboom@dot.state.ma.us>
Sent: Tuesday, February 11, 2025 2:52 PM
To: Larner, Erica N. (DOT); Maria George; Currier, Thomas H. (DOT); Lenker, Melissa (DOT); Paulson, David J. (DOT)
Cc: James Fitzgerald; Jason Mai; Dexter, Timothy D. (DOT); Lauren Howe-Januzzi; Ryan Paul; Benny Hung
Subject: RE: [EXT] RE: Section 7 Provincetown (608744)

CAUTION

Hi Erica,

We have made a No Effect Determination for both Roseate Tern and Rufa Red Knot based on no records of habitat or individuals within the project limits as determined by NHESP. I can revise the NLAA letter to reference TCB, since TCB is only proposed and there is no consultation required for proposed species. This letter will be available at the end of February/early March once our FHWA PBO is back up and running.

I hope this helps. Please let me know of any questions.

Thanks,
Julia

Julia Hoogeboom
Wildlife and Endangered Species Coordinator
Environmental Services
MassDOT Highway Division
857-772-1749

From: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>
Sent: Tuesday, February 11, 2025 2:46 PM
To: Maria George <Maria.George@apexcos.com>; Currier, Thomas H. (DOT) <Thomas.H.Currier@dot.state.ma.us>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Paulson, David J. (DOT) <David.J.Paulson@dot.state.ma.us>; Hoogeboom, Julia A. (DOT) <Julia.A.Hoogeboom@dot.state.ma.us>
Cc: James Fitzgerald <James.Fitzgerald@apexcos.com>; Jason Mai <Jason.Mai@apexcos.com>; Dexter, Timothy D. (DOT) <Timothy.Dexter@dot.state.ma.us>; Lauren Howe-Januzzi <Lauren.Howe@apexcos.com>; Ryan Paul <Ryan.Paul@apexcos.com>; Benny Hung <Benny.Hung@apexcos.com>
Subject: RE: [EXT] RE: Section 7 Provincetown (608744)

Hi Maria,

I'm including Dave Paulson and Julia Hoogeboom from Wildlife in this email in case they need to correct my statements.

Based on the IPaC Species list and the email from Maninder at ACOE, I do not see any way to avoid filing for a PCN. While we do have the NLAA for NLEB and the Indiana bat, the IPaC list still includes Tricolored Bat, Roseate Tern, and Rufa Red Knot. The project is outside of the Rufa Red Knot's critical habitat (I'm unsure if that matters), but the Roseate Tern and the Tricolored Bat would trigger the need for a PCN. I believe Maninder does say specifically that just the Tricolored Bat would trigger the PCN requirement.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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Location

Barnstable County, Massachusetts



Local office

New England Ecological Services Field Office

(603) 223-2541
(603) 223-0104

70 Commercial Street, Suite 300
Concord, NH 03301-5094

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

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2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered
Rufa Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1864	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

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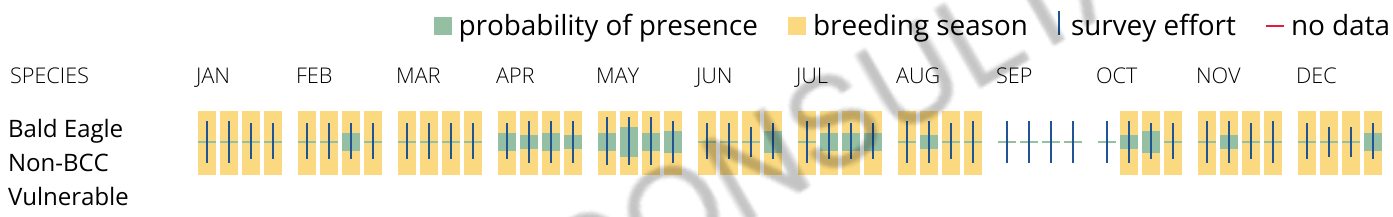
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your

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list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Oystercatcher Haematopus palliatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black Skimmer Rynchops niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Black-billed Cuckoo Coccyzus erythropthalmus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler Vermivora cyanoptera This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 1 to Jun 30
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler Cardellina canadensis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10

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Cerulean Warbler Setophaga cerulea — Breeds Apr 29 to Jul 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/2974

Chimney Swift Chaetura pelagica — Breeds Mar 15 to Aug 25
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Cory's Shearwater Calonectris diomedea — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Eastern Whip-poor-will Antrostomus vociferus — Breeds May 1 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Grasshopper Sparrow Ammodramus savannarum perpallidus — Breeds Jun 1 to Aug 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/8329

Gull-billed Tern Gelochelidon nilotica — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9501

Hudsonian Godwit Limosa haemastica — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Kentucky Warbler Geothlypis formosa — Breeds Apr 20 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

King Rail Rallus elegans — Breeds May 1 to Sep 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8936

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Least Tern Sternula antillarum antillarum — Breeds Apr 25 to Sep 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Manx Shearwater Puffinus puffinus — Breeds Apr 15 to Oct 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Pectoral Sandpiper Calidris melanotos — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prairie Warbler Setophaga discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Purple Sandpiper Calidris maritima — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ruddy Turnstone Arenaria interpres morinella — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

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Saltmarsh Sparrow Ammospiza caudacuta This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9719	Breeds May 15 to Sep 5
Scarlet Tanager Piranga olivacea This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Aug 10
Semipalmated Sandpiper Calidris pusilla This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Whimbrel Numenius phaeopus hudsonicus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey

effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

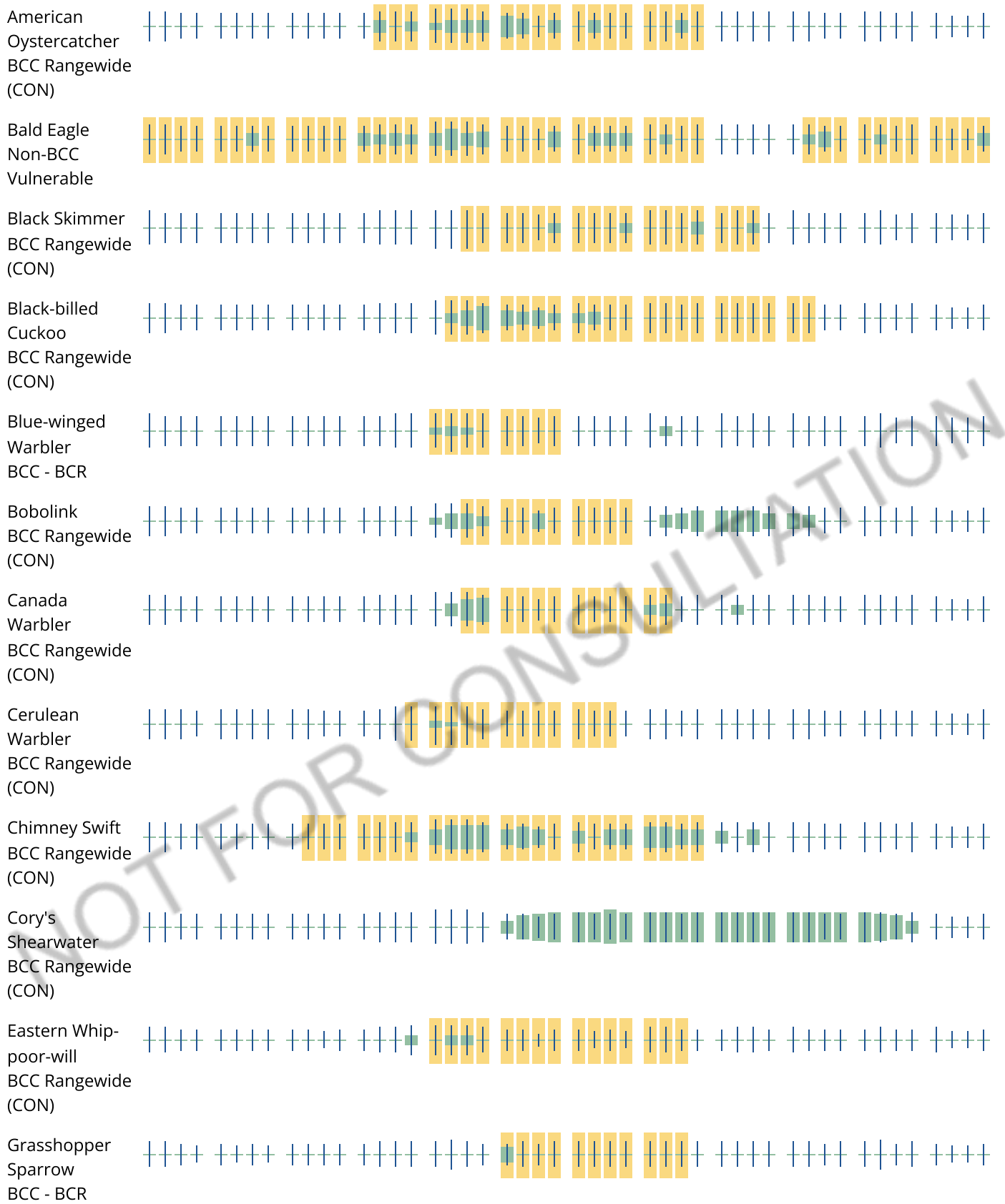
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

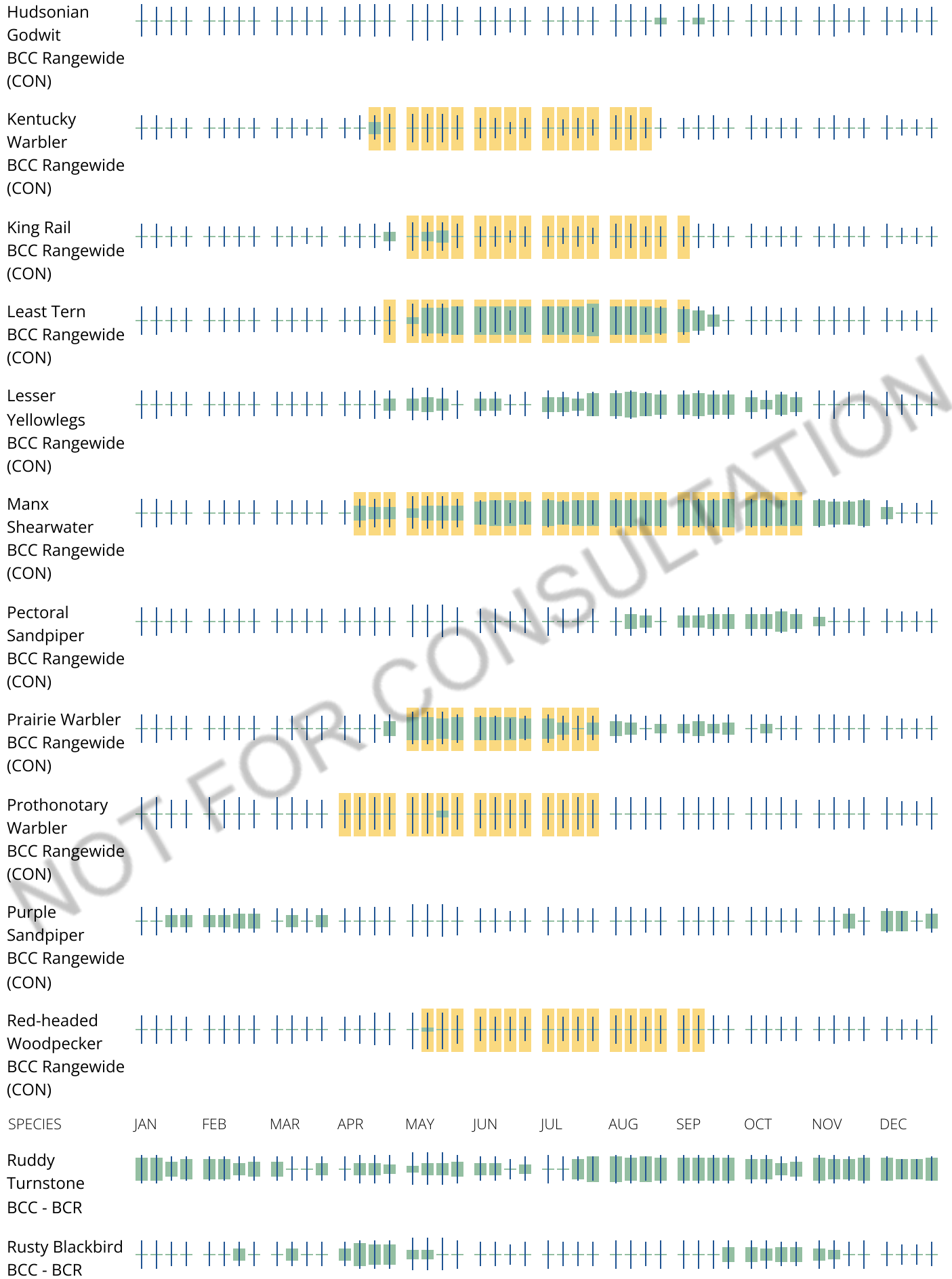
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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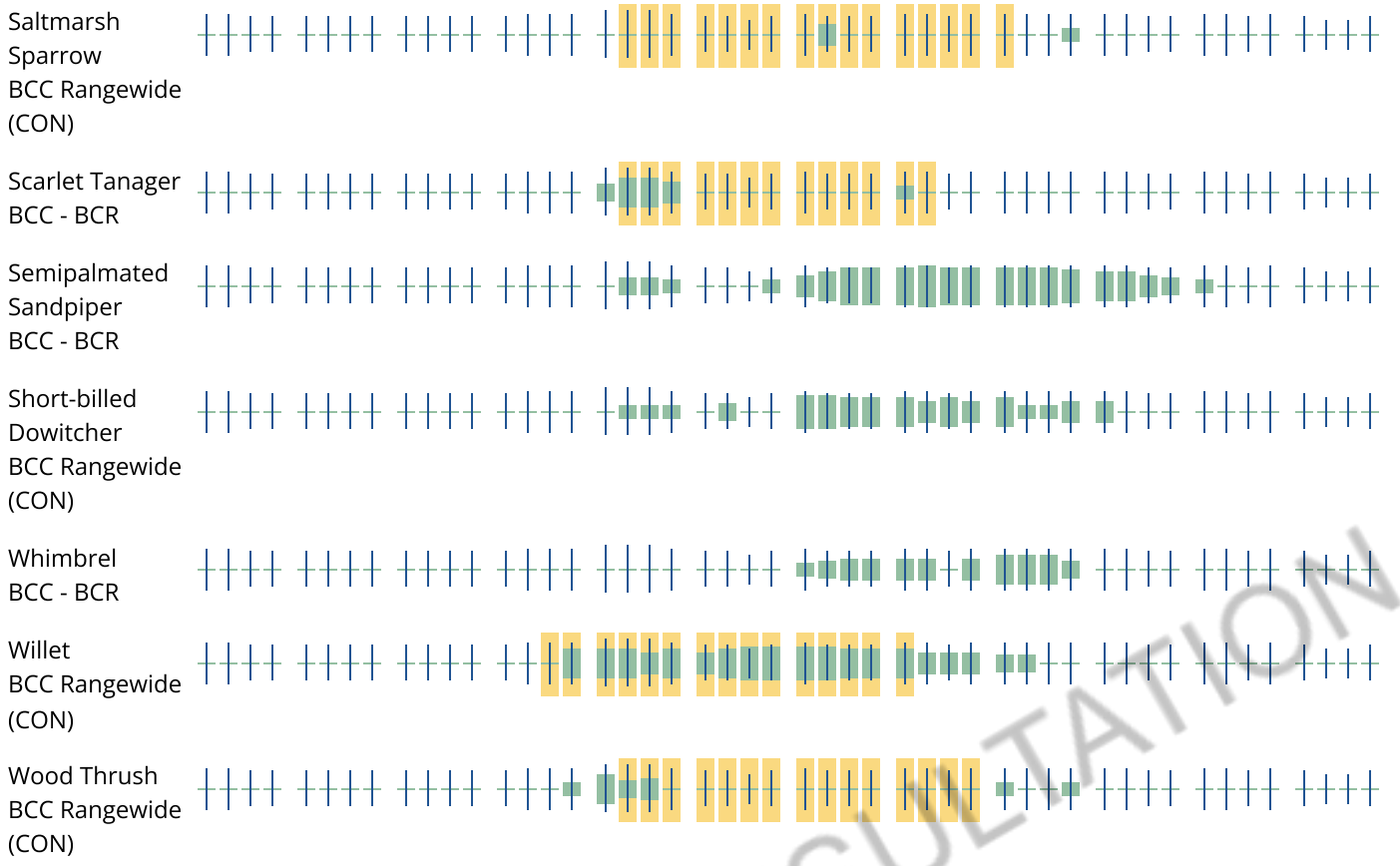




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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact

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Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

This location overlaps the following CBRS unit(s):

Otherwise Protected Area (OPA)

OPAs are denoted with a "P" at the end of the unit number. The only prohibition within OPAs is on Federal flood insurance. ***CBRA consultation is not required for projects within OPAs.*** *However, agencies providing disaster assistance that is contingent upon a requirement to*

purchase flood insurance after the fact are advised to disclose the OPA designation and information on the restrictions on Federal flood insurance to the recipient prior to the commitments of funds.

MA-19P - FI 11/25/2025

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

E1UBL

FRESHWATER FORESTED/SHRUB WETLAND

PSS1E
PFO1E
PFO4E

FRESHWATER POND

PUBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

NOT FOR CONSULTATION

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Rt. 6 / Shank Painter Rd & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 3,950.77 acres

Dec 27 2024 13:04:26 Eastern Standard Time



Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	2	2,503.88	N/A
Shortnose Sturgeon	1	1,251.98	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	4	5,007.91	N/A
Atlantic Large Whales	4	5,027.84	N/A
In or Near Critical Habitat	1	1,193.09	N/A

Atlantic Sturgeon

#	Feature ID	Species	Lifestage	Behavior	Zone
1	ANS_C50_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	N/A
2	ANS_C50_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	N/A

#	From	Until	From (2)	Until (2)	Area(acres)
1	01/01	12/31	N/A	N/A	1,251.94
2	01/01	12/31	N/A	N/A	1,251.94

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone
1	SNS_C50_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	N/A

#	From	Until	From (2)	Until (2)	Area(acres)
1	04/01	11/30	N/A	N/A	1,251.98

Sea Turtles

#	Feature ID	Species	Life Stage	Behavior	Zone
1	GRN_STN_AJV_MAF	Green sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)
2	KMP_STN_AJV_MAF	Kemp's ridley sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)
3	LTR_STN_AJV_MAF	Leatherback sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)
4	LOG_STN_AJV_MAF	Loggerhead sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)

#	From	Until	From (2)	Until (2)	Area(acres)
1	6/1	11/30	*No Data*	*No Data*	1,251.98
2	6/1	11/30	*No Data*	*No Data*	1,251.98
3	6/1	11/30	*No Data*	*No Data*	1,251.98
4	6/1	11/30	*No Data*	*No Data*	1,251.98

Atlantic Large Whales

#	Feature ID	Species	Lifestage	Behavior	Zone
1	RIT_WRN_AJV_FOR	North Atlantic right whale	Adults and juveniles	Foraging	Northeast (ME to Cape Cod, MA)
2	RIT_WRN_AJV_WIN	North Atlantic right whale	Adults and juveniles	Overwintering	Northeast (ME to Cape Cod, MA)
3	FIN_WFN_AJV_WIN	Fin whale	Adults and juveniles	Overwintering	Northeast (ME to Cape Cod, MA)
4	FIN_WFN_AJV_FOR	Fin whale	Adults and juveniles	Foraging	Northeast (ME to Cape Cod, MA)

#	From	Until	From (2)	Until (2)	Area(acres)
1	1/1	12/31	*No Data*	*No Data*	1,256.96
2	11/1	1/31	*No Data*	*No Data*	1,256.96
3	11/1	3/31	*No Data*	*No Data*	1,256.96
4	1/1	12/31	*No Data*	*No Data*	1,256.96

In or Near Critical Habitat

#	Species	In or Near Critical Habitat	Area(acres)
1	North Atlantic Right Whale	Critical Habitat Unit 1: Feeding Area	1,193.09

Appendix E

Historical Commission Notifications

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Wednesday, April 10, 2024 3:05 PM
To: Tashtesook@aol.com
Subject: MassDOT Project #608744: Provincetown, Shank Painter Road PNF
Attachments: Provincetown, Shank Painter Road PNF (608744).pdf; Plans - 75% construction plans.pdf

Mr. Brown,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza – Rm 7130
Boston, MA 02116
508-542-6967 (cell)

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Tashtesook@aol.com
Sent: Wednesday, April 10, 2024 3:06 PM
Subject: Relayed: MassDOT Project #608744: Provincetown, Shank Painter Road PNF

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

Tashtesook@aol.com (Tashtesook@aol.com)

Subject: MassDOT Project #608744: Provincetown, Shank Painter Road PNF

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH
APPENDIX A
MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: Roadway Reconstruction, Roundabout and Shared Use Path Construction (608744)

Location /Address: Route 6 and Shank Painter Road

City/Town: Provincetown

Project Proponent

Name: Massachusetts Department of Transportation

Address: 10 Park Plaza, Room 4260

City/Town/Zip/Telephone: Boston, MA 02116 / T: 857-368-8824

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
FHWA	Federal Aid Highway Program
Army Corps of Engineers	General Permit, Section 404 of the Clean Water Act
MassDOT	State Funding

Project Description (narrative):

MassDOT and the Town of Provincetown are proposing to expend federal funds to construct roadway and bicycle improvements along a 1.2-mile segment of Route 6 from the highway terminus at Province Lands Road easterly to a point 500' east of the unsignalized T-intersection at Shank Painter Road. Improvements also are proposed along Shank Painter Road for 0.5 mile from Route 6 southerly to Route 6A (Bradford Street). Currently Route 6 is comprised of one two-lane westbound barrel and one two-lane eastbound barrel separated by a vegetated median. The two barrels taper into a single two-directional barrel 1000' east of Province Lands Road. An abandoned segment of paved roadway, which appears to be the original terminus of the westbound barrel of Route 6, is located to the north of the active two-directional roadway at the current terminus of Route 6.

This project will reconstruct the active two-directional barrel at the highway's terminus and the westbound barrel of Route 6 to Shank Painter Road. The westbound barrel of Route 6 west of Shank Painter Road will be restriped and converted into a single two-directional barrel as part of a "road diet." A 16" wide rumble strip will separate the westbound and eastbound travel lanes.

The eastbound barrel of Route 6 west of Shank Painter Road will be deactivated as a vehicular highway due to low traffic volumes along that segment of the roadway and will be converted into a paved two-directional shared-use path for bicycles and pedestrians, which will connect downtown Provincetown to Herring Beach. The shared-use path will begin at Province Lands Road on the abandoned segment of westbound Route 6 and will cross over the active two-directional barrel of Route 6 to the eastbound barrel approximately 800' east of Province Land Road. The crossing will consist of a color, texturized crosswalk with detectable warning panels. Both the abandoned segment of the westbound barrel and the entire length of the eastbound barrel to Shank Painter Road will be sawcut along the sides to create a uniform 16' wide paved path that will be milled and resurfaced. The sloped shoulders along the path will be filled with sand borrow. The shared use path will be striped for two 8' wide travel lanes.

A new roundabout will be constructed within the existing highway layout at the T-intersection of Route 6

APPENDIX A (continued)

and Shank Painter Road. East of the new roundabout Route 6 will remain in its existing two-barrel eastbound/westbound configuration. The two barrels of Route 6 will be realigned into the existing median at the approaches east of the new roundabout and then will reconnect to the existing highway 500' to the east. A 500' long, 5' wide paved path will be constructed within the highway layout along the north side of Route 6 at the intersection of Shank Painter Road to enable cyclists to bypass the roundabout.

Shank Painter Road will be reconstructed with minor widening within the existing highway layout to create a consistent 38' wide cross section, which will include two 10' wide vehicular travel lanes and two 5' wide bicycle lanes separated from the vehicular travel lanes by 2' wide painted buffers. New cement concrete sidewalks will be constructed along both sides of Shank Painter Road within the existing highway layout where no sidewalks currently exist. Bicycle lanes on Shank Painter Road will connect to the new shared-use path on Route 6.

Drainage improvements will include installation of new catch basins and drainpipes along both Route 6 and Shank Painter Road. Several of the new drainpipes will outfall in wetlands, which will require a federal permit from the U. S. Army Corps of Engineers. A stormwater retention basin will be constructed on a formerly paved area within the existing highway layout immediately to the northeast of the new roundabout.

Does the project include demolition? No.
Does the project include rehabilitation of any existing buildings? No.
Does the project include new construction? No.

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

A review of the MHC's archaeological maps revealed no recorded pre-contact or historic archaeological sites in the vicinity of the project area. Proposed work along Route 6 will be located within the existing state highway layout on land that has been previously disturbed by divided highway construction and roadside grading. Proposed work along Shank Painter Road will be located within the existing Town layout on land that has been previously disturbed by roadway, utility, and drainage construction and intensive commercial development. It is the opinion of the MassDOT Archaeologist that the proposed work has little archaeological potential based on the absence of recorded pre-contact archaeological sites, previous roadway construction, and roadside development.

What is the total acreage of the project area?

Woodland	_____	acres	Productive Resources:		
Wetland	_____	acres	Agriculture	_____	acres
Floodplain	_____	acres	Forestry	_____	acres
Open Space	_____	acres	Mining/Extraction	_____	acres
Developed	_____	acres	Total Project Acreage	_____	Acres

APPENDIX A (continued)

What is the acreage of the proposed new construction? N/A acres

What is the present land use of the project area?
State highway and commercial development.

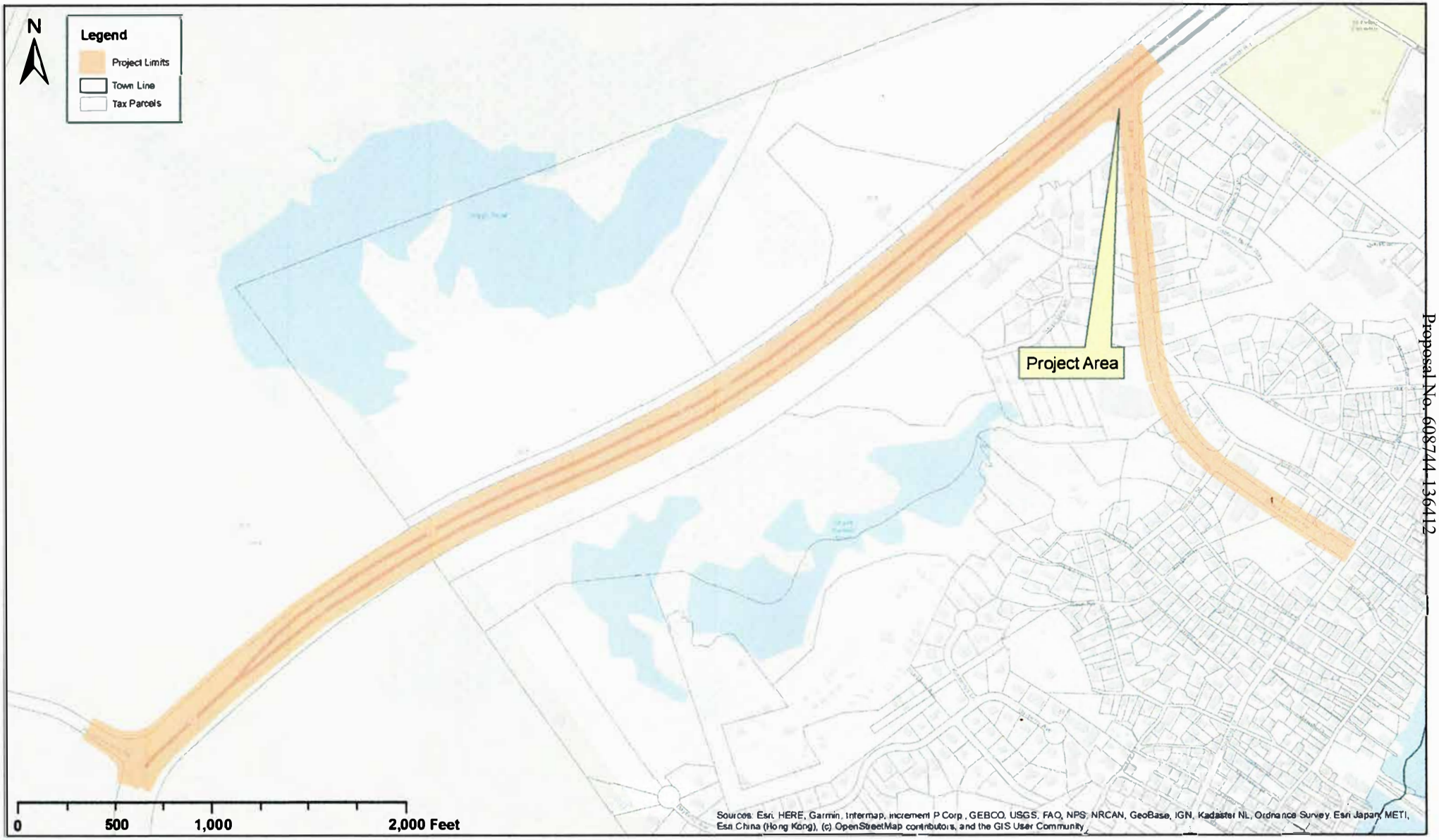
Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.
This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of person submitting this form: **Date:** 4/10/2024

Name:	Jeffrey Shrimpton, Cultural Resources Supervisor
Address:	Massachusetts Department of Transportation, 10 Park Plaza, Room 4260
City/Town/Zip:	Boston, MA 02116
Telephone:	857-368-8824

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.



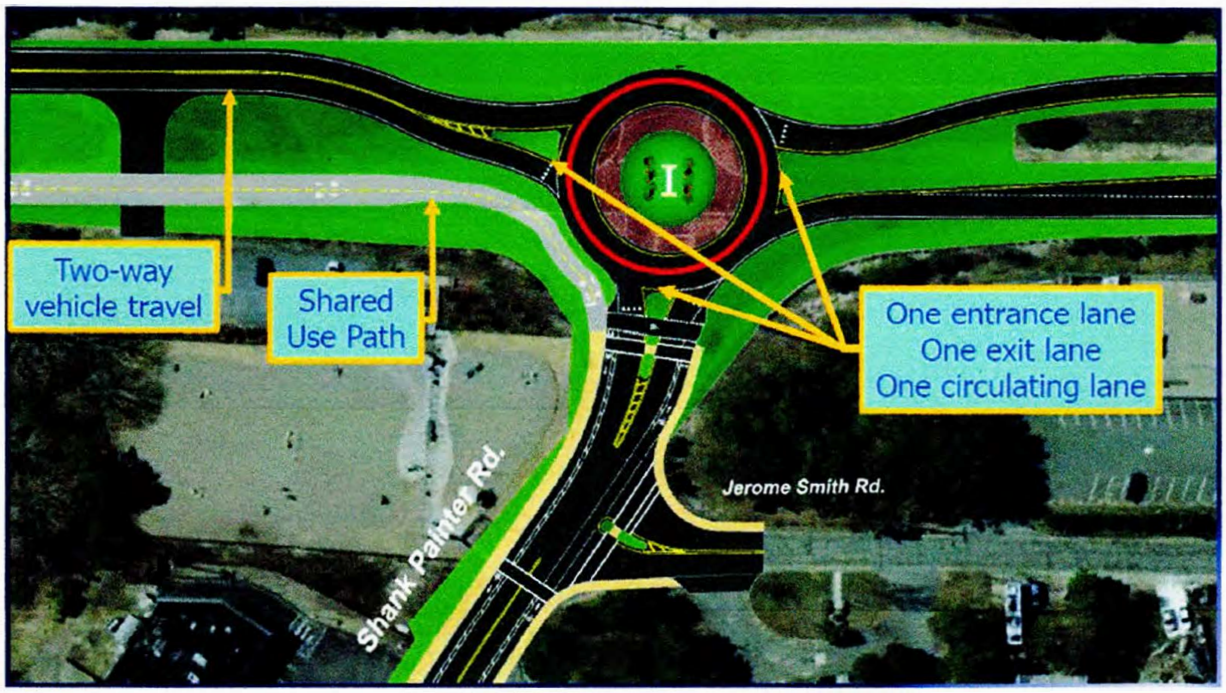
PROVINCETOWN, MA
RECONSTRUCTION OF SHANK PAINTER ROAD
PROJECT FILE NO. 608744

LOCUS MAP

ENVIRONMENTAL PARTNERS

A00830 - 67

Proposal No. 608744-136412



Environmental Partners

From: Shrimpton, Jeffrey P. (DOT)
To: Robinson, David S (EEA)
Cc: Harwood, Jameson (DOT)
Subject: MassDOT Project #608744, Provincetown--Shank Painter Road and Route 6 (1 of 3)
Date: Friday, March 20, 2020 2:15:00 PM
Attachments: PNF 608744.pdf
Locus Map.pdf
Roundabout.pdf

Hi David,
MassDOT staff is working remotely this week, as you probably are doing as well. I am sending a Project Notification Form to you for the above-noted project while Jamie Harwood is waiting to have his remote email set up. You may respond either to me or to Jamie. Please be aware that we are not in a rush for this project, so please respond at your convenience.
Best Regards,
Jeff Shrimpton

Jeffrey Shrimpton
Cultural Resources Supervisor
Massachusetts Department of Transportation
10 Park Plaza, Suite 4260
Boston, MA 02116
(857) 368-8824
Jeffrey.shrimpton@state.ma.us

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

March 20, 2020

David S. Robinson, Chief Archaeologist/State Underwater Archaeologist
Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, MA 02114-2199

RE: Provincetown, Route 6 and Shank Painter Road (608744)
Project Notification Form

Dear Mr. Robinson:

Enclosed please find a Project Notification Form (PNF) for the above-noted project. This project will be supported in part with federal funds. Work in water will require a permit from the U. S. Army Corps of Engineers. This project, therefore, is a federal undertaking that requires review under Section 106 of the National Historic Preservation Act of 1966, as amended.

MassDOT is submitting the enclosed project information to the Board of Underwater Archaeological Resources to meet the Section 106 consultation requirements of the U. S. Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Patricia Leavenworth, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

Please feel free to contact Jameson Harwood at 857-368-8799 if you have any questions regarding this project.

Sincerely,

Jeffrey Shrimpton
Cultural Resources Supervisor
Environmental Services

encs: PNF
Locus map
Project plans

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
www.mass.gov/massdot



SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to: 608744

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, MA 02535

9590 9402 3083 7124 2917 98

7019 1120 0001 4331 5952

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Bettina Washington ☐ Agent ☐ Addressee

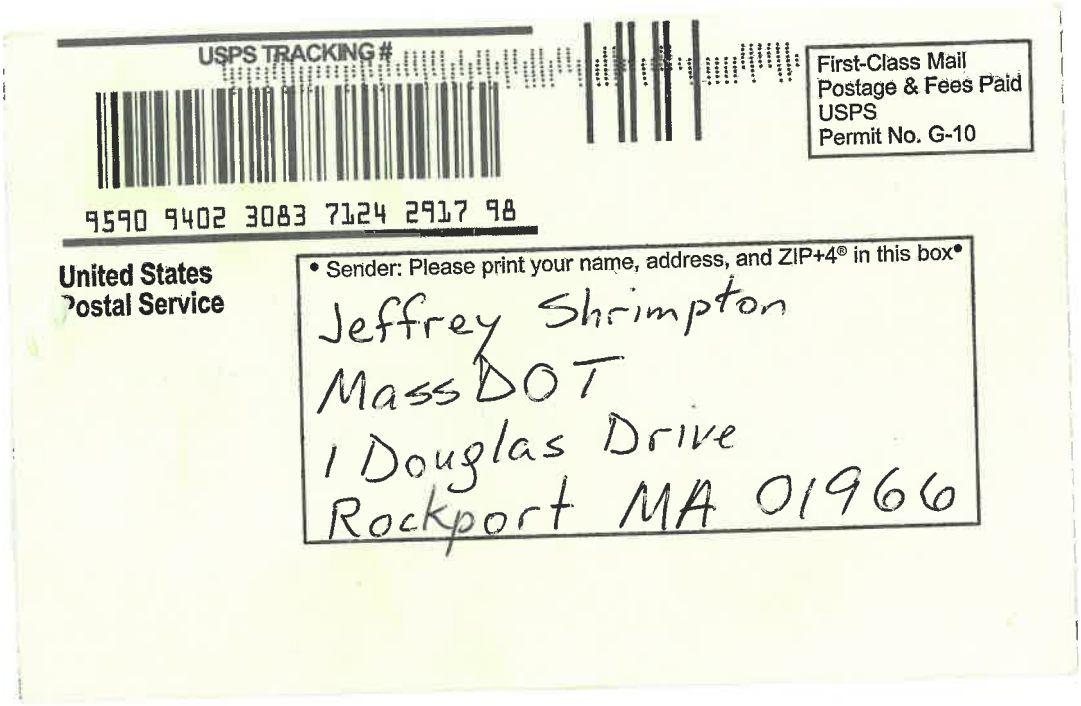
B. Received by (Printed Name) Bettina Washington
C. Date of Delivery 4/4/20

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

OPENED 5/28/20 COVID19

3. Service Type
☐ Adult Signature
☐ Adult Signature Restricted Delivery
☐ Certified Mail®
☐ Certified Mail Restricted Delivery
☐ Collect on Delivery
☐ Collect on Delivery Restricted Delivery
☐ Priority Mail Express®
☐ Registered Mail™
☐ Registered Mail Restricted Delivery
☐ Return Receipt for Merchandise
☐ Signature Confirmation™
☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2015 PSN 7530-02-000-9053 Domestic Return Receipt


USPS TRACKING #
9590 9402 3083 7124 2917 98
First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10
United States
Postal Service
• Sender: Please print your name, address, and ZIP+4® in this box•
Jeffrey Shrimpton
MassDOT
1 Douglas Drive
Rockport MA 01966

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

April 3, 2020

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, MA 02535

RE: Provincetown, Route 6 and Shank Painter Road (608744)
Project Notification Form

Dear Ms. Washington:

Enclosed please find a Project Notification Form (PNF) for the above-noted project. This project will be supported in part with federal funds. Work in water will require a permit from the U. S. Army Corps of Engineers. This project, therefore, is a federal undertaking that requires review under Section 106 of the National Historic Preservation Act of 1966, as amended.

MassDOT is submitting the enclosed project information to the Tribal Historic Preservation Officer to meet the Section 106 consultation requirements of both the Federal Highway Administration and the U. S. Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Patricia Leavenworth, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

Please feel free to contact Jameson Harwood at 857-368-8799 if you have any questions regarding this project.

Sincerely,

Jeffrey Shrimpton
Cultural Resources Supervisor
Environmental Services

encs: PNF
Locus map
Project plans

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
www.mass.gov/massdot

From: Shrimpton, Jeffrey P. (DOT)
To: David Weeden
Cc: Harwood, Jameson (DOT)
Subject: MassDOT Project #608744, Provincetown--Shank Painter Road and Route 6 (1 of 3)
Date: Friday, March 20, 2020 5:33:00 PM
Attachments: PNF 608744.pdf
Locus Map.pdf
Roundabout.pdf

Hi David,
MassDOT staff is working remotely through at least April 3 because of the state of emergency. I am sending a Project Notification Form to you for the above-noted project while Jamie Harwood is waiting to have his remote email set up. You may respond either to me or to Jamie. Please be aware that we are not in a rush for this project, so please respond at your convenience.
Best Regards,
Jeff Shrimpton

Jeffrey Shrimpton
Cultural Resources Supervisor
Massachusetts Department of Transportation
10 Park Plaza, Suite 4260
Boston, MA 02116
(857) 368-8824
Jeffrey.shrimpton@state.ma.us

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

March 20, 2020

Mr. David Weeden
Tribal Historic Preservation Officer
Mashpee Wampanoag Tribe
483 Great Neck Road South
Mashpee, MA 02649

RE: Provincetown, Route 6 and Shank Painter Road (608744)
Project Notification Form

Dear Mr. Weeden:

Enclosed please find a Project Notification Form (PNF) for the above-noted project. This project will be supported in part with federal funds. Work in water will require a permit from the U. S. Army Corps of Engineers. This project, therefore, is a federal undertaking that requires review under Section 106 of the National Historic Preservation Act of 1966, as amended.

MassDOT is submitting the enclosed project information to the Tribal Historic Preservation Officer to meet the Section 106 consultation requirements of the U. S. Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Patricia Leavenworth, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

Please feel free to contact Jameson Harwood at 857-368-8799 if you have any questions regarding this project.

Sincerely,

Jeffrey Shrimpton
Cultural Resources Supervisor
Environmental Services

encs: PNF
Locus map
Project plans

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
www.mass.gov/massdot

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A

MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: Roadway Reconstruction, Roundabout and Shared Use Path Construction (608744)

Location /Address: Route 6 and Shank Painter Road

City/Town: Provincetown

Project Proponent

Name: Massachusetts Department of Transportation

Address: 10 Park Plaza, Room 4260

City/Town/Zip/Telephone: Boston, MA 02116 / T: 857-368-8824

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
FHWA	Federal Aid Highway Program
Army Corps of Engineers	General Permit, Section 404 of the Clean Water Act
MassDOT	State Funding

Project Description (narrative):

MassDOT and the Town of Provincetown are proposing to expend federal funds to construct roadway and bicycle improvements along a 1.2-mile segment of Route 6 from the highway terminus at Province Lands Road easterly to a point 500' east of the unsignalized T-intersection at Shank Painter Road. Improvements also are proposed along Shank Painter Road for 0.5 mile from Route 6 southerly to Route 6A (Bradford Street). Currently Route 6 is comprised of one two-lane westbound barrel and one two-lane eastbound barrel separated by a vegetated median. The two barrels taper into a single two-directional barrel 1000' east of Province Lands Road. An abandoned segment of paved roadway, which appears to be the original terminus of the westbound barrel of Route 6, is located to the north of the active two-directional roadway at the current terminus of Route 6.

This project will reconstruct the active two-directional barrel at the highway's terminus and the westbound barrel of Route 6 to Shank Painter Road. The westbound barrel of Route 6 west of Shank Painter Road will be restriped and converted into a single two-directional barrel as part of a "road diet." A 16" wide rumble strip will separate the westbound and eastbound travel lanes.

The eastbound barrel of Route 6 west of Shank Painter Road will be deactivated as a vehicular highway due to low traffic volumes along that segment of the roadway and will be converted into a paved two-directional shared-use path for bicycles and pedestrians, which will connect downtown Provincetown to Herring Beach. The shared-use path will begin at Province Lands Road on the abandoned segment of westbound Route 6 and will cross over the active two-directional barrel of Route 6 to the eastbound barrel approximately 800' east of Province Land Road. The crossing will consist of a color, texturized crosswalk with detectable warning panels. Both the abandoned segment of the westbound barrel and the entire length of the eastbound barrel to Shank Painter Road will be sawcut along the sides to create a uniform 16' wide paved path that will be milled and resurfaced. The sloped shoulders along the path will be filled with sand borrow. The shared use path will be striped for two 8' wide travel lanes.

A new roundabout will be constructed within the existing highway layout at the T-intersection of Route 6

APPENDIX A (continued)

and Shank Painter Road. East of the new roundabout Route 6 will remain in its existing two-barrel eastbound/westbound configuration. The two barrels of Route 6 will be realigned into the existing median at the approaches east of the new roundabout and then will reconnect to the existing highway 500' to the east. A 500' long, 5' wide paved path will be constructed within the highway layout along the north side of Route 6 at the intersection of Shank Painter Road to enable cyclists to bypass the roundabout.

Shank Painter Road will be reconstructed with minor widening within the existing highway layout to create a consistent 38' wide cross section, which will include two 10' wide vehicular travel lanes and two 5' wide bicycle lanes separated from the vehicular travel lanes by 2' wide painted buffers. New cement concrete sidewalks will be constructed along both sides of Shank Painter Road within the existing highway layout where no sidewalks currently exist. Bicycle lanes on Shank Painter Road will connect to the new shared-use path on Route 6.

Drainage improvements will include installation of new catch basins and drainpipes along both Route 6 and Shank Painter Road. Several of the new drainpipes will outfall in wetlands, which will require a federal permit from the U. S. Army Corps of Engineers. A stormwater retention basin will be constructed on a formerly paved area within the existing highway layout immediately to the northeast of the new roundabout.

Does the project include demolition? No.
Does the project include rehabilitation of any existing buildings? No.
Does the project include new construction? No.

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

A review of the MHC's archaeological maps revealed no recorded pre-contact or historic archaeological sites in the vicinity of the project area. Proposed work along Route 6 will be located within the existing state highway layout on land that has been previously disturbed by divided highway construction and roadside grading. Proposed work along Shank Painter Road will be located within the existing Town layout on land that has been previously disturbed by roadway, utility, and drainage construction and intensive commercial development. It is the opinion of the MassDOT Archaeologist that the proposed work has little archaeological potential based on the absence of recorded pre-contact archaeological sites, previous roadway construction, and roadside development.

What is the total acreage of the project area?

Woodland	_____	acres	Productive Resources:		
Wetland	_____	acres	Agriculture	_____	acres
Floodplain	_____	acres	Forestry	_____	acres
Open Space	_____	acres	Mining/Extraction	_____	acres
Developed	_____	acres	Total Project Acreage	_____	Acres

APPENDIX A (continued)

What is the acreage of the proposed new construction? N/A acres

What is the present land use of the project area?
State highway and commercial development.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.
This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of person submitting this form: [signature] **Date:** April 3, 2020

Name:	Jeffrey Shrimpton, Cultural Resources Supervisor
Address:	Massachusetts Department of Transportation, 10 Park Plaza, Room 4260
City/Town/Zip:	Boston, MA 02116
Telephone:	857-368-8824

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

Letter of Transmittal

To	Massachusetts Historical Commission	Date 01/07/2025	Trans No. 01
	220 Morrissey Boulevard	Job No. R115-2005.00 Task 04	
	Boston, MA 02125	Re: Shank Painter Rd and Route 6 Roadway Reconstruction Project	

We are sending you the following items Via Certified Mail :

☐ Prints ☐ Invoices ☐ Shop Drawings ☐ Specifications

☐ Reports ☐ Disk(s) ☐ Copy of Letter/Memo ☒ Other

Copies	Date	Description
1		MHC Project Notification Form

These are transmitted:

☐ For Approval ☐ For Your Use ☐ As Requested ☒ For Review & Comment

Notes:

Dear File Reviewer,

Please see attached for the Massachusetts Historical Commission Project Notification Form submitted on behalf of the Provincetown Department of Public Works for the proposed Shank Painter Rd and Route 6 Roadway Reconstruction Project

From Apex Companies, LLC

Lauren Howe-Januzzi
Engineer
O: 617.657.0972
E: lauren.howe@apexcos.com

January 7, 2025

Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

RE: Project Notification Form
Shank Painter Rd and Route 6 Roadway Reconstruction Project
Provincetown, MA

To Whom It May Concern,

On behalf of the Town of Provincetown, Apex Companies, LLC (Apex) has prepared this Project Notification Form (PNF) for the proposed Shank Painter Rd and Route 6 Roadway Reconstruction Project in Provincetown, MA. This PNF is being submitted in advance of environmental regulatory applications.

Project Background

Shank Painter Road provides access between Route 6 and downtown Provincetown. Presently, the four-lane divided Route 6 corridor creates a barrier at the northern limit of Shank Painter Road making it challenging for bicyclists and pedestrians to reach popular recreational destinations along Route 6 such as the Cape Cod National Seashore, Herring Cove Beach, the Shank Painter Ponds and several trails. Additionally, Shank Painter Road and its surrounding properties regularly experience local flooding issues due to the small existing drainage network providing only minimal collection and conveyance. Most notably, the Town has concerns regarding the significant flooding occurring on Court Street, a mixed commercial and residential street that intersects with Shank Painter Road. The area has been experiencing flooding depths greater than 6 inches of standing water occur during intense storms, and greater depths have been found under modeled severe storms. This localized flooding constantly impacts surrounding property owners and traffic.

Proposed Project Description

To improve pedestrian and bicycle connections, Apex is proposing a combination of shared-use paths, sidewalks, and narrowed vehicular travel lanes along Route 6 and Shank Painter Road. At the Route 6 and Shank Painter Road intersection, a roundabout is proposed to efficiently process and calm motorist traffic as it enters this final section of Route 6 and Cape Cod. Apex is proposing a new stormwater management system along Shank Painter Road and Route 6 that combines the installation of new catch basins, conveyance piping, subsurface infiltration chambers, and a new detention pond and sedimentation forebay to provide improved drainage management. Additionally, Apex proposes to install a stormwater pump station on Court Street, which will allow for mitigation of the flooding within site restrictions.

If you require additional information or have any questions, please contact me at the number or email listed below

Sincerely,

Lauren K Howe-Januzzi

Apex Companies, LLC
Lauren Howe-Januzzi
Engineer

O: 617.657.0972
E: lauren.howe@apexcos.com

Attachments:

1. MHC Project Notification Form
2. USGS Locus Map
3. Site Photographs
4. Project Plan Excerpts

CC:
Jim Vincent, Public Works Director, Town of Provincetown
Braden Witt, DPW Senior Project Manager, Town of Provincetown
Melyssa Nickerson, Conservation Agent, Town of Provincetown
Benny Hung, PE, Apex Companies
Ryan Paul, PE, CFM, Apex Companies
Maria George, PE, Apex Companies

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A

MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: Shank Painter Rd and Route 6 Roadway Reconstruction Project

Location / Address: Route 6, Shank Painter Rd and Court St

City / Town: Provincetown, MA

Project Proponent

Name: Jim Vincent, Provincetown Department of Public Works

Address: 2 Mayflower Street

City/Town/Zip/Telephone: Provincetown, MA 02657, 508-487-7060

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
MassDOT	Transportation Improvement Program (TIP) Funding

Project Description (narrative):

To improve pedestrian and bicycle connections and calm motorist traffic, a combination of shared-use paths, sidewalks, narrowed traffic lanes, and a roundabout at the intersection of Rt 6. and Shank Painter Rd are proposed as part of this project. The project also includes a new stormwater management system along Shank Painter Rd, Route 6 and Court St. This includes the installation of new catch basins, conveyance piping, subsurface infiltration chambers, outfalls, a new detention pond and sedimention forebay, and a new stormwater pump station on Court St.

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition.

No.

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation.

No.

Does the project include new construction? If so, describe (attach plans and elevations if necessary).

Yes. The project involves reconstruction of roadways, new sidewalks, new drainage structures, and a new stormwater pump station on Court Street. Design plans for the project are attached.

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A (continued)

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

No.

What is the total acreage of the project area?

Woodland	acres	Productive Resources:	
Wetland	0.006 acres	Agriculture	acres
Floodplain	acres	Forestry	acres
Open space	0.75 acres	Mining/Extraction	acres
Developed	17.244 acres	Total Project Acreage	18 acres

What is the acreage of the proposed new construction? 18 acres

What is the present land use of the project area?

The project area primarily consists of impervious right-of-way, commercial zones, and mixed-use areas combining commercial and residential properties. Additionally, two small forested wetlands are present in locations where new drainage outfalls are planned. The stormwater detention pond north of the intersection of Route 6 and Shank Painter Rd will be constructed near, but not in abutting wetland areas.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.

Attached.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of Person submitting this form: Lauren K Howe Januzzi Date: 1/7/2025

Name: Lauren Howe-Januzzi, Apex Companies

Address: 18 Commerce Way, Suite 2000

City/Town/Zip: Woburn, MA 01801

Telephone: 617-657-0972

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Massachusetts Historical Commission
220 Morrissey Blvd
Boston, MA 02125

9590 9402 8397 3156 6963 46

2. Article Number *(Transfer from service label)*

9589 0710 5270 1539 9835 02

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X Mass historical ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

ROXBURY MA
JAN 10 2025

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
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- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

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☐ Return Receipt (hardcopy)	$0.00
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☐ Certified Mail Restricted Delivery	$0.00
☐ Adult Signature Required	$0.00
☐ Adult Signature Restricted Delivery	$
Postage	$2.59
$	
Total Postage and Fees	$11.54
$	

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WOBURN, MA 01801
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01/07/2025

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Street and Apt. No., or PO Box No. 220 Morrissey Blvd
City, State, ZIP+4® Boston, MA 02125

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

Letter of Transmittal

To BUAR
100 Cambridge St, Suite 900
Boston, MA 02114

Date 03/13/2025 Trans No. 01
Job No. PRO066-0630071-22007741, Task 1, Phase 3
Attn. David Robinson
Re: Route 6, Shank Painter Rd, and Court St Road and Drainage Reconstruction Project

We are sending you the following items Via Email :

☐ Prints ☐ Invoices ☐ Shop Drawings ☐ Specifications
☐ Reports ☐ Disk(s) ☐ Copy of Letter/Memo ☒ Other

Copies	Date	Description
1		MHC Project Notification Form

These are transmitted:

☐ For Approval ☐ For Your Use ☐ As Requested ☒ For Review & Comment

Notes:

Dear File Reviewer,

Please see attached for the January 2025 Massachusetts Historical Commission Project Notification Form submitted on behalf of the Provincetown Department of Public Works for the proposed Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction Project. Please advise if there are historical resources within the project limits.

From Apex Companies, LLC

Copy To File
Ryan Paul, P.E.

Lauren Howe-Januzzi
Engineer
O: 617.657.0972
E: lauren.howe@apexcos.com

Lauren Howe-Januzzi

From: Lauren Howe-Januzzi
Sent: Thursday, March 13, 2025 9:33 AM
To: david.s.robinson@mass.gov
Subject: Historical Project Notification: Provincetown, MA
Attachments: LOT_BUAR.pdf; MHC PNF Full 1.7.2025.pdf

Good Morning David,

Per Army Corps of Engineering Requirements, please see the attached document for the Project Notification Form submi tted to the Massachusetts Historical Commission for the Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction project in Provincetown, MA.

Please let me know when you have received this electronic copy or if you would like for me to send a hard copy as well. In addition, please advise if there are any historical resources within the project limits.

Thank you,
Lauren Howe-Januzzi

Lauren Howe-Januzzi
Engineer
She/Her
Apex Companies, LLC
18 Commerce Way, Ste 2000, Woburn, MA 01801
617-657-0972
***ENR* Top 30 All-Environmental Firm**
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Letter of Transmittal

To Mashpee Wampanoag Tribe
483 Great Neck Road South
Mashpee, MA 02649

Date 03/13/2025 Trans No. 01
Job No. PRO066-0630071-22007741, Task 1, Phase 3
Attn. David Weeden
Re: Route 6, Shank Painter Rd, and Court St Road and Drainage Reconstruction Project

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Copies	Date	Description
1		MHC Project Notification Form

These are transmitted:

☐ For Approval ☐ For Your Use ☐ As Requested ☒ For Review & Comment

Notes:

Dear File Reviewer,

Please see attached for the January 2025 Massachusetts Historical Commission project notification form submitted on behalf of the Provincetown Department of Public Works for the proposed Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction Project. Please advise if there are historical resources within the project limits.

From Apex Companies, LLC

Copy To File
Ryan Paul, P.E.



Lauren Howe-Januzzi
Engineer
O: 617.657.0972
E: lauren.howe@apexcos.com

Lauren Howe-Januzzi

From: Lauren Howe-Januzzi
Sent: Thursday, March 13, 2025 9:37 AM
To: 106review@mwtribe-nsn.gov
Cc: David.Weeden@mwtribe-NSN.gov; Nakia.HendricksJr@mwtribe-nsn.gov
Subject: Historical Project Notification: Provincetown, MA
Attachments: LOT_Mashpee Wampanoag.pdf; MHC PNF Full 1.7.2025.pdf

Good Morning David,

Per Army Corps of Engineering Requirements, please see the attached document for the Project Notificat ion Form submitted to the Massachusetts Historical Commission for the Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction project in Provincetown, MA.

Please let me know when you have received this electronic copy or if you would like for me to send a hard copy as well.
In addition, please advise if there are any historical resources within the project limits.

Thank you,
Lauren Howe-Januzzi

Lauren Howe-Januzzi
Engineer
She/Her
Apex Companies, LLC
18 Commerce Way, Ste 2000, Woburn, MA 01801
617-657-0972
***ENR* Top 30 All-Environmental Firm**
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Letter of Transmittal

To Narragansett Indian Tribe
4425 South Country Trail
Charlestown, RI 02813

Date 03/13/2025 Trans No. 01

Job No. PRO066-0630071-22007741, Task 1, Phase 3

Attn. John Brown

Re: Route 6, Shank Painter Rd, and Court St Road and Drainage Reconstruction Project

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Copies	Date	Description
1		MHC Project Notification Form

These are transmitted:

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Notes:

Dear File Reviewer,

Please see attached for the January 2025 Massachusetts Historical Commission project notification form submitted on behalf of the Provincetown Department of Public Works for the proposed Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction Project. Please advise if there are historical resources within the project limits.

From Apex Companies, LLC

Copy To File
Ryan Paul, P.E.

Lauren Howe-Januzzi
Engineer
O: 617.657.0972
E: lauren.howe@apexcos.com

Lauren Howe-Januzzi

From: Lauren Howe-Januzzi
Sent: Thursday, March 13, 2025 9:42 AM
To: tashtesook@aol.com
Subject: Historical Project Notification: Provincetown, MA
Attachments: LOT_Narragansett.pdf; MHC PNF Full 1.7.2025.pdf

Good Morning John,

Per Army Corps of Engineering Requirements, please see the attached document for the Project Notificat ion Form submitted to the Massachusetts Historical Commission for the Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction project in Provincetown, MA.

Please let me know when you have received this electronic copy or if you would like for me to send a hard copy as well.
In addition, please advise if there are any historical resources within the project limits.

Thank you,
Lauren Howe-Januzzi

Lauren Howe-Januzzi
Engineer
She/Her
Apex Companies, LLC
18 Commerce Way, Ste 2000, Woburn, MA 01801
617-657-0972
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Letter of Transmittal

To	Wampanoag Tribe of Gay Head (Aquinnah)	Date	03/13/2025 Trans No. 01
	20 Black Brook Rd	Job No.	PRO066-0630071-22007741, Task 1, Phase 3
	Aquinnah, MA 02535	Attn.	Bettina Washington
		Re:	Route 6, Shank Painter Rd, and Court St Road and Drainage Reconstruction Project

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☐ Reports ☐ Disk(s) ☐ Copy of Letter/Memo ☒ Other

Copies	Date	Description
1		MHC Project Notification Form

These are transmitted:

☐ For Approval ☐ For Your Use ☐ As Requested ☒ For Review & Comment

Notes:

Dear File Reviewer,

Please see attached for the January 2025 Massachusetts Historical Commission Project Notification Form submitted on behalf of the Provincetown Department of Public Works for the proposed Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction Project. Please advise if there are historical resources within the project limits.

From Apex Companies, LLC

Copy To File
Ryan Paul, P.E.

Lauren Howe-Januzzi
Engineer
O: 617.657.0972
E: lauren.howe@apexcos.com

Lauren Howe-Januzzi

From: Lauren Howe-Januzzi
Sent: Thursday, March 13, 2025 9:47 AM
To: thpo@wampanoagtribe-nsn.gov
Subject: Historical Project Notification: Provincetown, MA
Attachments: LOT_Wampanoag of Gay Head.pdf; MHC PNF Full 1.7.2025.pdf

Good Morning Bettina,

Per Army Corps of Engineering Requirements,
please see the attached document for the Project Notification Form submitted to the Massachusetts His torical Commission for the Route 6, Shank Painter Rd and Court St Road and Drainage Reconstruction project in Provincetown, MA.

Please let me know when you have received this electronic copy or if you would like for me to send a hard copy as well.
In addition, please advise if there are any historical resources within the project limits.

Thank you,
Lauren Howe-Januzzi

Lauren Howe-Januzzi
Engineer
She/Her
Apex Companies, LLC
18 Commerce Way, Ste 2000, Woburn, MA 01801
617-657-0972
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From: Newton, Kevin M CIV USARMY CENAE (USA)
To: Maria George
Cc: ryan.paul; Larner, Erica N. (DOT); Braden Witt; benny.hung; Lenker, Melissa (DOT)
Subject: RE: NAE-2025-01880 [EXT] RE: GP #23, SVN, Provincetown MA
Date: Wednesday, August 13, 2025 12:23:19 PM
Attachments: image001.png
image002.png

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Maria,

Thanks for clarifying.

We have logged this SVNF into our database under file number NAE-2025-01880. Please reference this number in any future correspondence with us.

This confirmation that we have received the SV notification form does not confirm that the work is authorized under the GPs for MA. By submitting the SV application, you are self-verifying that your project is authorized under, and meets the terms and conditions of, the applicable GPs with no review by the Corps of Engineers. Activities that do not qualify for SV require a PCN submittal to the Corps.

Please let me know if you have any questions.

Thanks,

Kevin Newton
Project Manager
U.S. Army Corps of Engineers
New England District, Regulatory Division
696 Virginia Road
Concord, MA 01742
(978) 318-8044

USACE is now accepting pre-construction notifications and applications through the Regulatory Request System (RRS)! USACE intends to fully transition to the RRS to better serve you and the Nation. Effective September 1, 2025, information submitted through the RRS will be given priority over email submittals. To help ensure timely receipt and processing, please submit your pre-construction notifications and permit applications via the clickable RRS link below.

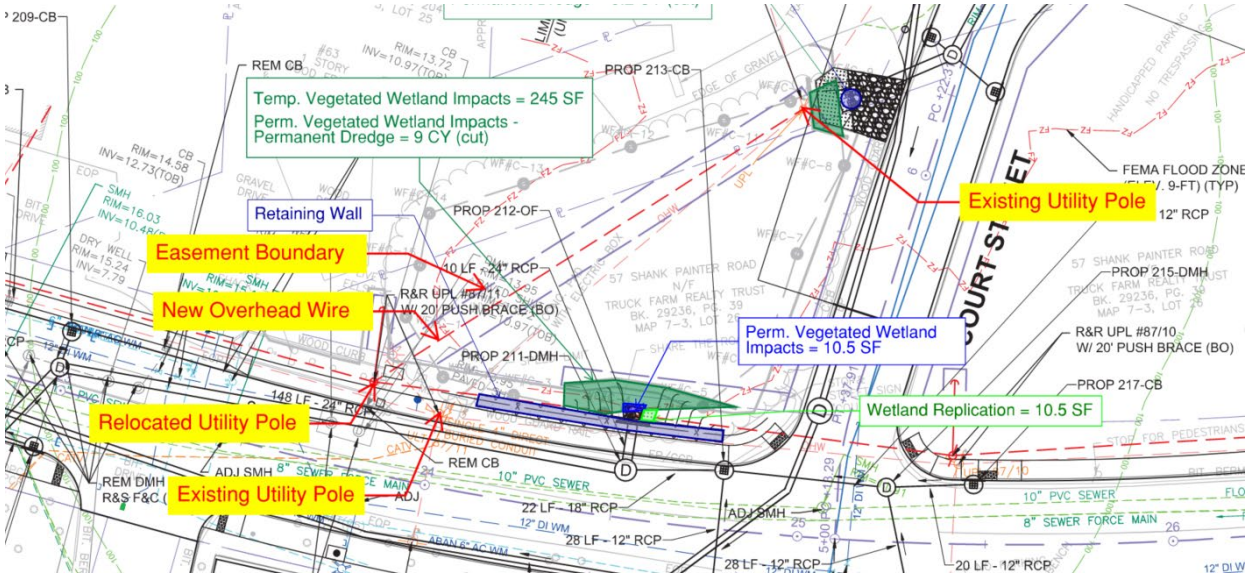


USACE RRS Promo 90-sec (youtube.com)

From: Maria George <Maria.George@apexcos.com>
Sent: Wednesday, August 13, 2025 11:12 AM
To: Newton, Kevin M CIV USARMY CENAE (USA) <Kevin.M.Newton@usace.army.mil>; Vasconcelos, Daniel B CIV USARMY CENAE (USA) <Daniel.B.Vasconcelos@usace.army.mil>
Cc: Ryan Paul <Ryan.Paul@apexcos.com>; Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Braden Witt <bwitt@provincetown-ma.gov>; Benny Hung <Benny.Hung@apexcos.com>; Melissa.Lenker@dot.state.ma.us
Subject: [Non-DoD Source] RE: [EXT] RE: GP #23, SVN, Provincetown MA

Hi Kevin,

Yes absolutely! I've marked up a screenshot below. There are two utility poles located in/around the existing wetland area. The utility pole on the Court Street side is in the wetland area and will remain in place. The utility pole on the Shank Painter side is in the sidewalk and will be relocated. The red dashed line is the new wire that will be run between the relocated utility pole and the existing utility pole. The purple dashed lines are the easement lines for the utility line. There is no fill or discharge associated with this work.



Let me know if you have any other questions!

Sincerely,

Maria George, PE
Sr Project Engineer
She/Her
Apex Companies, LLC
18 Commerce Way, Ste 2000, Woburn, MA 01801
Office: 617-657-0952
Mobile: 774-285-0776

From: Newton, Kevin M CIV USARMY CENAE (USA) <Kevin.M.Newton@usace.army.mil>
Sent: Wednesday, August 13, 2025 9:43 AM
To: Maria George <Maria.George@apexcos.com>; Vasconcelos, Daniel B CIV USARMY CENAE (USA) <Daniel.B.Vasconcelos@usace.army.mil>
Cc: Ryan Paul <Ryan.Paul@apexcos.com>; Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Braden Witt <bwitt@provincetown-ma.gov>; Benny Hung <Benny.Hung@apexcos.com>; Melissa.Lenker@dot.state.ma.us
Subject: [EXT] RE: GP #23, SVN, Provincetown MA

You don't often get email from kevin.m.newton@usace.army.mil. Learn why this is important
CAUTION

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Thanks,

Kevin Newton
Project Manager
U.S. Army Corps of Engineers
New England District, Regulatory Division
696 Virginia Road
Concord, MA 01742
(978) 318-8044

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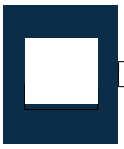


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Thank you,



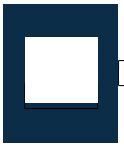
Maria George, PE
Sr Project Engineer
She/Her
Apex Companies, LLC
18 Commerce Way, Ste 2000, Woburn, MA 01801
Office: 617-657-0952
Mobile: 774-285-0776

From: Maria George
Sent: Tuesday, August 12, 2025 11:44 AM
To: Kevin.M.Newton@usace.army.mi; Daniel.B.Vasconcelos@usace.army.mil
Cc: Larner, Erica N. (DOT) <erica.n.larner@dot.state.ma.us>; Ryan Paul <Ryan.Paul@apexcos.com>; Braden Witt <bwitt@provincetown-ma.gov>; Benny Hung <Benny.Hung@apexcos.com>
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DOCUMENT A00831

ARMY CORPS OF ENGINEERS

GENERAL PERMIT

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From: Newton, Kevin M CIV USARMY CENAE (USA)
To: Maria George
Cc: ryan.paul; Larner, Erica N. (DOT); Braden Witt; benny.hung; Lenker, Melissa (DOT)
Subject: RE: NAE-2025-01880 [EXT] RE: GP #23, SVN, Provincetown MA
Date: Wednesday, August 13, 2025 12:23:19 PM
Attachments: image001.png
image002.png

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Maria,

Thanks for clarifying.

We have logged this SVNF into our database under file number NAE-2025-01880. Please reference this number in any future correspondence with us.

This confirmation that we have received the SV notification form does not confirm that the work is authorized under the GPs for MA. By submitting the SV application, you are self-verifying that your project is authorized under, and meets the terms and conditions of, the applicable GPs with no review by the Corps of Engineers. Activities that do not qualify for SV require a PCN submittal to the Corps.

Please let me know if you have any questions.

Thanks,

Kevin Newton
Project Manager
U.S. Army Corps of Engineers
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696 Virginia Road
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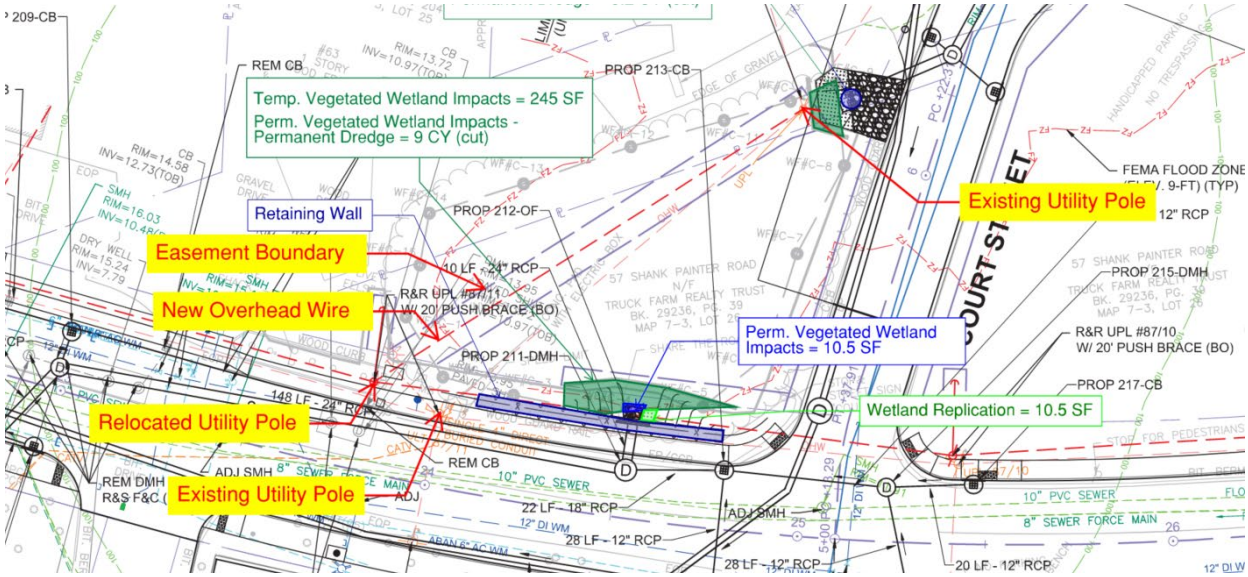


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Subject: [Non-DoD Source] RE: [EXT] RE: GP #23, SVN, Provincetown MA

Hi Kevin,

Yes absolutely! I've marked up a screenshot below. There are two utility poles located in/around the existing wetland area. The utility pole on the Court Street side is in the wetland area and will remain in place. The utility pole on the Shank Painter side is in the sidewalk and will be relocated. The red dashed line is the new wire that will be run between the relocated utility pole and the existing utility pole. The purple dashed lines are the easement lines for the utility line. There is no fill or discharge associated with this work.



Let me know if you have any other questions!

Sincerely,

Maria George, PE
Sr Project Engineer
She/Her
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18 Commerce Way, Ste 2000, Woburn, MA 01801
Office: 617-657-0952
Mobile: 774-285-0776

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General Permit No.: NAE-2022-02649 Final Effective Date: June 2, 2023
Applicant: General Public, Commonwealth of Massachusetts Expiration Date: June 1, 2028

Department of the Army
General Permits for the Commonwealth of Massachusetts

The New England District of the U.S. Army Corps of Engineers (USACE) hereby issues twenty-five (25) regional general permits (GPs) for activities subject to USACE jurisdiction in waters of the U.S., including wetlands, navigable waters within the Commonwealth of Massachusetts and adjacent ocean waters to the seaward limit of the outer continental shelf. The Massachusetts GPs (hereafter referred to as the MA GP or GP) are issued in accordance with USACE regulations at 33 CFR 320 – 332 [see 33 CFR 325.5(c)(1)]. These GPs establish criteria and contain permit conditions to ensure that the authorized activities have no more than minimal individual and cumulative adverse impacts to the environment.

This document contains the following sections:		Pages
SECTION I	Statutory Authorities & Regulated Activities	2
SECTION II	Review Categories & Application Procedures	3-7
SECTION III	Massachusetts General Permits	8-34
SECTION IV	General Conditions	35-51
SECTION V	Mitigation Standards	52-54
SECTION VI	Federal & State Agency Contact Information & Websites	55-56
SECTION VII	Definitions & Acronyms	57-66
APPENDIX A	Guidance for Section 106 NHPA Compliance in Massachusetts	67-71
APPENDIX B	Pre-Construction Notification	72-77
APPENDIX C	Self-Verification Notification	78-81
APPENDIX D	Pre-Construction Notification Application Checklist	82-88

In issuing these GPs, the Federal Government does not assume any liability for the following: (a) damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes; (b) damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the U.S. in the public interest; (c) damages to persons, property or to other permitted or unpermitted activities or structures caused by the activity authorized by any of the GPs; (d) design or construction deficiencies associated with the permitted work; or (e) damage claims associated with any future modification, suspension or revocation of these permits.

Tammy R. Turley 02 June 2023

Tammy R. Turley Date
Chief, Regulatory Division

SECTION I. STATUTORY AUTHORITES & REGULATED ACTIVITIES

1. Work Requiring USACE Authorization

a. Section 10: Work and structures that are located in, over, under or that affect navigable waters of the United States (U.S.) (see 33 CFR 329). The USACE regulates these activities under section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322).

b. Section 404: The discharge of dredged or fill material into waters of the U.S (see 33 CFR 328). The USACE regulates these activities under Section 404 of the Clean Water Act (CWA). The term "discharge of dredged or fill material" also includes certain discharges resulting from excavation. Applicants should contact USACE to determine if a particular excavation discharge occurring within waters of the U.S., is a regulated activity. See 33 CFR 323.4 of the CWA for exempted activities.

For additional information on the limits of USACE jurisdiction, please see: https://www.nae.usace.army.mil/Portals/74/docs/regulatory/JurisdictionalLimits/Jurisdictional_Limits_Brochure.pdf

2. Authority to Issue General Permits

a. In accordance with 33 CFR 322.2(f), 325.2(e)(2), and 325.5(c), USACE may issue regional general permits authorizing activities under Section 10 of the RHA.

b. In accordance with Section 404(e) of the CWA, 33 USC 1344(e), and 33 CFR 323.2(h), 325.2(e)(2), and 325.5(c), after notice and opportunity for public hearing, USACE may issue regional general permits for any category of activities involving discharges of dredged or fill material if the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will only have minimal cumulative adverse effect on the environment.

3. Related Laws

33 CFR 320.3 includes a list of related laws including, but not limited to, Section 408 of the Rivers and Harbors Act of 1899, Section 401 of the Clean Water Act, Section 402 of the Clean Water Act, Section 307(c) of the Coastal Zone Management Act of 1972, Section 106 of the National Historic Preservation Act of 1966, Section 7 of the Endangered Species Act, the Fish and Wildlife Coordination Act of 1956, the Magnuson-Stevens Fishery Conservation and Management Act, the Fish and Wildlife Coordination Act, Section 302 of the Marine Protection, Research and Sanctuaries Act of 1972, Section 7(a) of the Wild and Scenic Rivers Act, the Golden Eagle Protection Act, and the Migratory Bird Treaty Act.

SECTION II. REVIEW CATEGORIES & APPLICATION PROCEDURES

To qualify under these GPs, the design, construction, and maintenance associated with each proposed activity must meet the terms and eligibility criteria listed in Section III, all applicable general conditions (GCs) in Section IV, and any specific mitigation requirements in Section V. Applicants should first review the GPs to see if a project is eligible for authorization under one or more of the GPs within this document. Any activity not specifically listed may still be eligible for authorization under these GPs; applicants are advised to contact USACE for specific eligibility determination.

Please note that these GPs allow for Self-Verification (SV) contingent upon meeting all criteria and with full adherence to all GCs. Projects that do not qualify for SV, may meet criteria for Pre-Constriction Notification (PCN). Tables are provided under each activity, which outline criteria for SV and PCN. Activities that do not meet criteria for SV or PCN may require review as an Individual Permit (IP). Activities may require a PCN or IP as noted in Sections III and/or IV of this GP. Notwithstanding compliance with the terms of these GPs, USACE retains discretionary authority to require either PCN review or IP review on a case-by-case basis for any project based on concerns for the environment or for any of the other public interest factors found in 33 CFR 320.4(a). These GPs also do not replace or change those activities identified as exempt from USACE regulation (33 CFR 323.4).

1. Pre-Application Assistance

Prospective applicants may request a pre-application meeting to address any questions they may have. USACE may also request a pre-application meeting or additional information to facilitate review of the request. Pre-application meetings and/or site visits help streamline the authorization process by alerting the prospective applicant to potentially time-consuming factors that may arise during the evaluation of their project (e.g., avoidance, minimization and compensatory mitigation requirements, historic properties, endangered species, essential fish habitat, impacts to federal projects, and/or dredging of contaminated sediments).

To schedule a pre-application meeting, present questions, or if you need further assistance, please contact USACE at:

Email: cenae-r-ma@usace.army.mil (strongly preferred) Phone: (978) 318-8338

Mail: U.S. Army Corps of Engineers
New England District
Regulatory Division, Massachusetts Section
696 Virginia Road
Concord, MA 01742

2. Submitting a Request

Please follow the procedures outlined in Sections II.2-5 when requesting an SV or applying for PCN authorization for activities covered by these GPs. The GPs are provided in Section III below. For SV-eligible projects, the Self-Verification Notification (SVN) must be submitted within 30 days of commencing work. Otherwise, a Pre-Construction Notification (PCN) must be submitted for work that is not SV-eligible. Please include appropriate drawings and attachments and submit your request using the mailbox identified in Section II.4 or II.5 below. USACE will promptly confirm receipt of your request and notify you in the event additional information is required. Guidance on

how to submit electronic correspondence is located on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/Submitting-Electronic-Correspondence.

3. Local, State & Federal Approvals

Applicants are responsible for applying for and obtaining any required local, state, and federal permits or approvals. These must be obtained prior to the commencement of work in waters. Such authorizations may include a Water Quality Certification, a Coastal Zone Management Act consistency determination, and other approvals as noted below. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law.

I. Water Quality Certification under Section 401 of the Federal Clean Water Act (33 USC 1341).
Applicants are responsible for determining the appropriate 401 Water quality Certification (WQC) requirements and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Applicants that are unsure of whether their activity has been certified should contact MassDEP, or EPA Region 1 when the activity is located on tribal lands, for a determination. The 401 WQC requirement must be satisfied by acquiring one of the following WQCs from MassDEP (see GC 8):

General 401 WQC: The MassDEP issued a WQC on April 21, 2023 conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of this WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC

Applicants should refer to the following link to determine if their activity is eligible: *https://www.nae.usace.army.mil/Missions/Regulatory/ State-General-Permits/ Massachusetts-General-Permit/*. If eligible, you must comply with all applicable WQC conditions. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.

Individual 401 WQC: In the event the proposed activity is not covered by the general WQC, applicants shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the applicant shall submit their Individual 401 WQC application concurrently to MassDEP and the USACE to comply with 40 CFR 121.

Activities Proposed on Tribal Lands: When an activity is proposed on Tribal lands, the applicant shall refer to the general 401 WQCs granted by the Environmental Protection Agency (EPA), Region 1 on May 15, 2023. These 401 WQCs are located on the USACE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

II. Coastal Zone Management Act Federal Consistency Concurrence pursuant to Section 307 of the CZMA of 1972, as amended. Federal consistency concurrence is required for all activities located within the coastal zone, unless determined otherwise by the Massachusetts Office of Coastal Zone Management (MA CZM) (see GC 9). As applicable, this requirement must be satisfied by acquiring one of the following from the MA CZM:

General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25 and this can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. The applicant must obtain all applicable permits and approvals prior to the commencement of work in USACE jurisdiction (i.e., construction begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the applicant. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review. During review of the PCN application, USACE may request additional information from the applicant to support CZM's evaluation of the activity.

Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 to require Individual Concurrence. The applicant must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.

The MA CZM program includes five regional offices that serve 78 coastal municipalities. The following map provides more information about these offices: https://www.mass.gov/service-details/czm-regions-coastal-communities-and-coastal-zone-boundary

III. Other Approvals: Approvals typically required in Massachusetts include, but are not limited to, a Chapter 91 Permit/License, Massachusetts Environmental Protection Act (MEPA) review, Wetlands Protection Act Order of Conditions, and/or Aquaculture Certification. *Applicants should also be aware that USACE may not be able to render a permit decision in the event the proposed activity is denied by another local, state and/or federal agency.*

4. Procedures for Self-Verification (SV) Eligible Projects

If the activity is eligible for an SV, the Self-Verification Notification (SVN) must be completed prior to the start of project construction and submitted to USACE within 30 days of commencing work. The purpose of the SVN is to provide applicants with a tool to assist them when determining if the activity as proposed is SV-eligible. The following GPs do not require submission of the SVN: GP 1 (SV #1), GP 3 (SV #2-3), GP 4 (SV #2), GP 11, GP 12 (note #2), GP 14 (see note), GP 15 (see note), and GP 24 (SV #3). **For the activities not listed above, the SVN must be completed prior to the start of work and be kept on site at all times during project construction.** The applicant shall not begin work for SV-eligible activities until they have completely verified the bulleted items below.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the SVN submittal. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma-sv@usace.army.mil (email) or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible SV Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and

- When required, are supported by a complete SVN (Appendix C); and
- Receive all other required local, State, and/or Federal approvals.

5. Procedures for Pre-Construction Notification (PCN) Eligible Projects

For activities that require a PCN, an application to and written authorization from USACE is required. *No work requiring a PCN may proceed until the applicant receives written authorization from USACE verifying that the activity is authorized.* The verification letter may include special conditions that the applicant must comply with. When possible, it is *highly* recommended that PCN application materials are submitted at least 90 days before the target start date to allow for USACE evaluation and any necessary agency consultations. PCN applications shall demonstrate in writing how the proposed activity complies with all GCs, as applicable to their activity.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the PCN application. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma@usace.army.mil or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible PCN Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and
- Comply with the Mitigation Standards within this document (Section V); and
- Are supported by a complete PCN document (Appendix B); and
- When required, are supported by the submittal of project information to the appropriate parties identified in Appendix A; and
- Receive all other required local, State, and/or Federal approvals.

6. Interagency Review Procedures

The USACE reserves the opportunity to coordinate PCN activities with Federal and State agencies to ensure that the proposed activity results in no more than a minimal impact to the aquatic environment. In some cases, USACE may require project modifications involving avoidance, minimization, and/or compensatory mitigation for unavoidable impacts to ensure the net effects of a project are minimal. The USACE determines, after review and coordination with the agencies and/or the applicant, if PCN applications:

a. Meet the terms and conditions of the GP as proposed;
b. Require additional information;
c. Require avoidance, minimization, compensatory mitigation, construction sequencing, project modification, or other special conditions to avoid or minimize adverse impacts to the aquatic environment;
d. Require individual permit review regardless of whether the terms and GCs of these GPs are met, based on concerns for the aquatic environment or any other factor of the public interest (see Section 9 below).

For activities requiring a PCN, the applicant must wait for written authorization from USACE before commencing activities in waters of the U.S. Beginning work for PCN required activities without a USACE written authorization is a violation of these GPs, and the terms and conditions of this document. The applicant may be subjected to an enforcement action by USACE and/or the Environmental Protection Agency (EPA).

7. Construction of Solid Fill Structures and Fills Along the Coastline or Baseline from Which the Territorial Sea is Measured.

Projects involving the construction of solid fill structures or discharge of fill that may extend beyond the coastline or the baseline from which the territorial sea is measured (i.e., mean low water) will require a PCN. The USACE will submit a description of the proposed work and a copy of the plans to the Solicitor, Department of the Interior, Washington, DC 20240, and request comments concerning the effects of the proposed work on the outer continental rights of the United States. These comments will be included in the administrative record of the application. After completion of permit review, the record will be forwarded to the Chief of Engineers. The decision on the application will be made by the Secretary of the Army after coordination with the Attorney General.

8. Emergency Activities

Per 33 CFR 325.2(e)(4), an emergency is limited to a situation that would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a permit is not undertaken within a time period less than the normal time needed to process an application under standard procedures. Emergency work shall be limited to that which is necessary to stabilize and secure the situation. Additional work needed for final repairs shall not be completed until approval is obtained through the appropriate, non-emergency process. Emergency work is subject to the same terms and conditions of these GPs as non-emergency work, and similarly, must qualify for authorization under these GPs; otherwise, an IP is required. *See GP 25 Emergency Situations for additional information.*

9. Individual Permit

Projects that do not meet the terms and conditions of this GP may require review as an IP (33 CFR 325.5 (b)). Proposed work in this category will require a separate Federal application for an individual permit from USACE (33 CFR 325.1). In addition, USACE retains discretionary authority on a case-by-case basis to elevate GP-eligible activities to an IP based on concerns for the environment or any other factor of the public interest (33 CFR 320.4 (a)). Applicants are required to submit the appropriate application materials directly to USACE as early as possible to expedite the permit review process. General information and application forms can be obtained at our website or by contacting our office at cenae-r-ma@usace.army.mil or (978) 318-8338. Individual 401 WQC and/or CZMA Federal consistency concurrence from the appropriate MA agencies are required before USACE can issue an individual permit. Applying for an IP does not relieve the applicant from their obligation to obtain all required Federal, State and/or local approvals.

10. Compliance

Applicants shall ensure compliance with all applicable GPs in Section III, GCs in Section IV, and any special conditions included in USACE verification letters. Noncompliance with these GPs, GCs, and special conditions may subject the applicant to criminal, civil, or administrative penalties, and/or an ordered restoration, and/or the permit may be modified, suspended or revoked by USACE. The USACE will consider any activity requiring USACE authorization to be noncompliant if that activity does not comply with all GP terms and conditions at all times, including while the project is under construction and when work is completed.

SECTION III. MASSACHUSETTS GENERAL PERMITS

Applicants are encouraged to review Sections I & II prior to submitting an application to confirm that the activity as proposed complies with all terms and conditions of the 2023 MA GPs. Applicants are also encouraged to review the definitions in Section VII, Definitions & Acronyms, of this document. Several terms are frequently used throughout the GPs, and it is important for the reader to understand these terms. If seeking verification for an activity previously verified under the 2018 MA GPs, please contact the USACE to discuss permitting needs in advance of submitting an application.

General Permits

1. Aids to Navigation and Temporary Recreational Structures
2. Maintenance
3. Moorings
4. Structures in Navigable Waters of the U.S.
5. Boat Ramps and Marine Railways
6. Utility Lines, Oil or Natural Gas Pipelines, Outfall Or Intake Structures, and Appurtenant Features
7. Dredging, Disposal of Dredged Material, Beach Nourishment, Rock Removal and Rock Relocation
8. U.S. Coast Guard Approved Bridges
9. Bank and Shoreline Stabilization
10. Aquatic Habitat Restoration, Enhancement, and Establishment Activities
11. Fish and Wildlife Harvesting and Attraction Devices and Activities
12. Response Operations, Oil and Hazardous Substances
13. Cleanup of Hazardous and Toxic Waste
14. Scientific Measurement Devices
15. Survey Activities
16. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
17. Residential, Commercial and Institutional Developments, and Recreational Facilities
18. Aquaculture
19. Mining Activities
20. Living Shorelines
21. Agricultural Activities
22. Reshaping Existing Drainage Ditches, Construction of New Ditches, and Mosquito Management
23. Linear Transportation Projects and Wetland/Stream Crossings
24. Temporary Construction, Access, and Dewatering
25. Emergency Situations

GP 1. AIDS TO NAVIGATION AND TEMPORARY RECREATIONAL STRUCTURES (Authority: §10)

(a) The placement of aids to navigation and regulatory markers that are approved by and installed in accordance with the requirements of the U.S. Coast Guard (USCG). See 33 CFR, Part 66; and (b) Temporary buoys, markers, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use. See GC 16.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Aids to navigation and regulatory markers approved by and installed in accordance with the requirements of the USCG. 2. Temporary buoys, markers and similar structures that are: (a) placed for recreational use during specific events and removed within 30 days after event; or (b) placed during winter events on ice and removed before spring thaw. These structures must be authorized by the local harbormaster, not located within an FNP or its buffer zone, and not located in saltmarsh or tidal vegetated shallows.	1. Impacts in saltmarsh or tidal vegetated shallows. 2. Activities that are not SV eligible.

Note: An SVN submittal to USACE is not required for work authorized under SV #1 above.

GP 2. MAINTENANCE (Authorities: §10 and §404)

Repair, rehabilitation, or replacement of any previously authorized[1], currently serviceable structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 (activities occurring before certain dates), provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction technique requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above. Maintenance dredging and beach nourishment are not eligible under GP 2 (see GP 7). Stream crossing modifications (including sliplining), replacements or extensions are not eligible under GP 2 (see GPs 6, 17, 23). *See GP 25 Emergency Situations for expedited review of emergency activities.*

Not authorized under GP 2 (IP required): (a) Permanent impacts in >1 acre in non-tidal waters and/or wetlands; or (b) Permanent impacts >1/2 acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; or (c) Temporary impacts >1 acre in tidal waters; >5000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >1000 SF in vegetated shallows; (d) New stream channelization or stream relocation projects (e.g., those in response to storm or flood events).

Self-Verification Eligible

Maintenance activities that meet all of the following terms:

1. In non-tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF[2] and not located in vegetated shallows or riffle and pool complexes.

2. In tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF, ≤1,000 SF in mudflats and/or natural rocky habitat, and not located in saltmarsh and tidal vegetated shallows.

3. Minor deviations in the repair, rehabilitation, or replacement of previously authorized, currently serviceable structures or fills.

4. Bulkhead replacement in tidal and non-tidal waters via installation of new bulkhead within 18 inches of the existing bulkhead and associated backfill.

5. Drawdown of an impoundment for dam/levee repair provided it does not exceed 18 months and one growing season (April through September).

Pre-Construction Notification Required

1. Discharges associated with removal of accumulated sediments and debris in the vicinity of existing structures, including intake and outfall structures and associated canals.

2. The removal of sediment outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) that is ≥200 linear feet. This activity is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions existing when the structure was built.

3. Dam and flood control or levee repair, rehabilitation, or replacement involves:
   a. A change in the flood elevation or permanent water surface elevation of the impoundment; or
   b. Drawdown of impoundment for construction exceeding one growing season (see SV eligible #5);
   c. Any modification that changes the character, scope, or size of the original fill design; or
   d. Does not meet SV eligible 1-7.

4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.

[1] Some maintenance activities may not be subject to regulation under Section 404 of the CWA in accordance with 33 CFR 323.4(a)(2). Per 33 CFR 330.3, Vested dates are: a) Work performed and structures installed before December 18, 1968 (Section 10); and b) Fill placed before July 25, 1975 (Section 404).
[2] This excludes dam projects that may require a temporary drawdown with impacts >5,000 SF in non-tidal waters. Instead, the drawdown shall comply with SV #5 to be eligible under Self-Verification.

6. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project or within the boundaries of the structure or fill. 7. Work to previously approved tide gates not affecting upstream tidal resource areas.	5. Activities located in the Connecticut River or Merrimack River, unless they are completed in the dry or when the tide is waterward of the work area. 6. Activities on USACE properties & USACE-controlled easements. 7. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.
Notes: 1. This authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the CWA §404(f) exemption for maintenance. See 33 CFR 323.4(a)(2). Prior USACE permits may have included authorization to maintain the activity, in which case authorization under this GP is not necessary. 2. See GC 22 for information on temporary construction mats.	

GP 3. MOORINGS (Authority: §10)

New moorings and mooring fields; the relocation of previously authorized moorings; expansions, boundary reconfigurations or modifications of previously authorized mooring fields; and maintenance and replacement of moorings.

Not authorized under GP 3 (IP required): (a) Moorings or mooring fields converted to or associated with a new boating facility[1]; or (b) Moorings in a USACE Federal Navigation Anchorage or USACE Federal Navigation Channel, except municipal-operated mooring fields.

Self-Verification Eligible	Pre-Construction Notification Required
1. New or relocated moorings that meet all the following terms: a. Authorized by a local harbormaster/ municipality under MGL Chapter 91 §10A; and b. No interference with navigation; and c. Single boat, single-point and non-commercial; and d. Not associated with a boating facility, and e. Neither placed within nor impact tidal vegetated shallows (e.g., eelgrass); and f. Not located within a USACE Federal navigation project (FNP) or the FNP buffer zone. 2. Existing, authorized moorings are converted from traditional moorings to low impact mooring technology (see note below) and/or helical anchors. 3. Maintenance and replacement of moorings authorized by the USACE.	1. New mooring fields; or expansions, boundary reconfigurations or modifications of existing, authorized mooring fields. 2. Moorings located such that they, and/or vessels docked or moored at them, are within the buffer zone of the horizontal limits of a Federal Anchorage. The buffer zone is equal to 3 times the authorized depth of that channel (see GC 15). 3. New individual moorings located in saltmarsh, mudflats, natural rocky habitat, and tidal vegetated shallows. Locating moorings these areas should be avoided to the maximum extent practicable. If these areas cannot be avoided, plans should show conservation mooring or low-impact mooring systems that prevent mooring chains from resting or dragging on the bottom substrate at all tides, where practicable. USACE may require a survey in areas previously mapped as containing eelgrass or within 100 ft. of existing eelgrass beds to document presence or absence of eelgrass and to determine the appropriate type and amount of compensatory mitigation for impacts to eelgrass. 4. Replacement moorings located in tidal vegetated shallows. 5. Moorings that are not SV eligible and do not require an IP.

Notes:

1. Low impact mooring systems, including conservation moorings, are encouraged to minimize impacts of chain scouring from conventional moorings during the tidal cycle.
2. An SVN submittal to USACE is not required for work authorized under SV #2-3 above.

[1] Boating facilities are marinas, yacht clubs, boat clubs, boat yards, dockominiums, town facilities, land/homeowner's associations, etc. that provide for a fee, rent or sell mooring or docking space. Not classified as boating facilities are municipal moorings or municipal mooring fields that charge an equitable user fee based only on the actual costs incurred.

GP 4. STRUCTURES IN NAVIGABLE WATERS OF THE U.S. (Authority: §10 & §404)

New, expansions, reconfigurations or modifications of structures for navigational access in waters of the U.S. including but not limited to temporary/seasonal or permanent pile and pole-supported piers, floats, stairs, shore outhauls, and boat and float lifts.

Not authorized under GP 4 (IP required): (a) Structures associated with a new boating facility; (b) Structures in a USACE Federal anchorage or channel; or (c) Artificial reefs.

Self-Verification Eligible

1. Private, non-commercial piers, floats and lifts that meet all the following terms:

a. Piers and floats in: (i) Tidal waters total ≤600 SF combined; and (ii) Non-tidal navigable waters of the U.S. total ≤600 SF combined; and

b. Piers are ≤4 feet wide and ≥6 feet above the marsh substrate (the height is measured from the marsh substrate to the bottom of the lowest longitudinal support); and

c. Floats and lifts in tidal waters and non-tidal navigable waters of the U.S. are ≥24 inches above the substrate during all tidal cycles. Float stops are preferred when site conditions warrant them (i.e., low tide exposes substrate), and skids can only be used in areas where piles are not feasible and on sandy or hard bottom substrates; and

d. Piers, floats and lifts: (i) Are ≥25 feet from previously mapped or existing vegetated shallows, or riparian property line extensions; (ii) Extend ≤25% of the waterway width in non-tidal navigable waters of the U.S. or MHW in tidal navigable waters of the U.S.

e. Installation of ≤12-inch diameter timber piles. Installation of ≥12-inch diameter piles of any material type when installed in the dry.

2. Fenders and similar structures.

Pre-Construction Notification Required

1. Shore outhauls.
2. Expansions, modifications, or new reconfiguration zones at any authorized boating facility.
3. New, expansions, reconfigurations, reconfiguration zones, or modifications of structures that provide public, community or government recreational uses such as boating, fishing, swimming, access, etc.
4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.
5. Located within the buffer zone of the horizontal limits of an FNP (GC 15).
6. Miscellaneous structures.
7. Impacts in tidal vegetated shallows.
8. Structures that are not SV eligible and do not require an IP.

Notes:

1. See GC 19 regarding pile driving and pile removal in navigable waters and
2. See GC 20 regarding time of year restrictions in tidal waters.
3. Boating facilities are facilities that provide for a fee, rent, or sell mooring space, such as marinas, yacht clubs, boat clubs, boat yards, town facilities, dockominiums, etc. Pile supported structures with no discharges of dredged or fill material are not regulated by USACE in non-navigable waters.
4. A SVN submittal to USACE is not required for SV #2 above.

GP 5. BOAT RAMPS AND MARINE RAILWAYS (Authorities: §10 and §404)

Activities required for the construction of boat ramps and marine railways, including excavation and fill.

Not authorized under GP 5 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters of the U.S., >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows[1]; or (c) dredging in navigable waters of the U.S. (see GP 7).

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. Boat ramps are located within 25 feet of property line extensions unless the properties are owned by the same owner. The USACE may require a letter of no objection from the abutter(s).
2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows.	2. Activities that are not eligible for SV and do not require an IP.

GP 6. UTILITY LINES, OIL OR NATURAL GAS PIPELINES, OUTFALL OR INTAKE STRUCTURES, AND APPURTENANT FEATURES (Authorities: §10 & §404)

Activities required for: (a) The construction, maintenance, repair or removal of utility lines, oil or natural gas pipelines[1], outfall or intake structures[2], and appurtenant features including the associated excavation, backfill, or bedding for these structures. (b) The construction, maintenance, or expansion of substations and other appurtenant facilities associated with a utility line, oil or natural gas pipeline, and outfall or intake structure in non-tidal waters of the U.S.; and (c) The construction and maintenance of foundations for overhead utility line towers, poles, and anchors in tidal and non-tidal waters of the U.S., provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible. This GP authorizes the construction of access roads to facilitate construction of the above activities provided the activity, in combination with all other activities included in one single and complete project, does not exceed the thresholds identified below (IP required). Access roads used solely for construction of the utility line must be removed upon completion of the work. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.[3]

Not authorized under GP 6 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters of the U.S.; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Stormwater treatment or detention systems, or subsurface sewage disposal systems in waters of the U.S.; or (d) New tide gates that do not meet SV criteria below.

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows. 3. Intake structures that are dry hydrants used exclusively for firefighting activities with no stream impoundments. 4. New tide gates on outfall structures for pipes conveying stormwater and/or industrial NPDES-permitted discharges from waters that are not waters of the U.S.	1. New outfall and/or intake structures. 2. Unconfined work or silt producing activities in streams with diadromous fish. 3. Submarine cables, conduits, or pipelines that occur in, over or under navigable waters of the U.S. 4. Stream channelization, relocation, impoundment, or loss of streambed occurs. 5. The activity is placed within and runs parallel to or along a streambed within waters of the U.S. 6. There is a permanent change in preconstruction contours in waters of the U.S. 7. Installation of utility lines or gas/oil pipelines using trench excavation where material is temporarily sidecast into waters of the U.S. for >3 months. Applicants must demonstrate how the material would not be dispersed by currents or other forces. 8. Activities that are not SV eligible and do not require an IP.

[1] See the definitions of a “utility line” and “oil or natural gas pipeline” in Section VII.
[2] Outfall structures must be in compliance with regulations issued under the National Pollutant Discharge Elimination System Program (Section 402 of the Clean Water Act).
[3] Temporary impacts shall comply with all GCs, including GC 32 Utility Line Installation and Removal.

GP 7. DREDGING (Authority: §10), DISPOSAL OF DREDGED MATERIAL (Authorities: §10, §404), BEACH NOURISHMENT (Authorities: §10 & §404), ROCK REMOVAL (Authority: §10) AND ROCK RELOCATION (Authorities: §10 & §404)

New, improvement and maintenance dredging (see notes below) including: (a) Disposal of dredged material at a confined aquatic disposal cell, beach nourishment location, near shore site, or ocean disposal site selected under Section 404 of the Clean Water Act pursuant to the 404(b)(1) Guidelines, provided the dredged material meets the requirements for such disposal; (b) Beach nourishment not associated with dredging; and (c) Rock removal and relocation for navigation.

Not authorized under GP 7 (IP required): (a) Dredging where ocean disposal is required for the disposal of dredged material (Section 103); New dredging >½ acre; ≥10,000 CY; >1000 SF permanent impacts to intertidal areas, saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF permanent impacts to tidal vegetated shallows; (b) Maintenance or improvement dredging and/or disposal with >1 acre of impacts to intertidal areas, saltmarsh, mudflats, riffle and pool complexes, or non-tidal vegetated shallows; (c) New dredging where the primary purpose is sand mining for beach nourishment; (d) Beach scraping; (e) Boulder removal and relocation for navigation >½ acre; or (f) Blasting.

Self-Verification Eligible

1. Maintenance dredging of previously dredged areas, with upland disposal, that meet all of the following terms:
   a. Dredged area ≤1/2 acre; and
   b. Activities comply with GC 20, TOY Restrictions. The time-of-year restriction(s) stated in Appendix B of the MA Division of Marine Fisheries (DMF) Technical Report TR-47[1] can apply instead if the general TOY restriction if a TOY is provided for a specific waterbody and is less restrictive. This is to protect endangered species, EFH, and other species; and
   c. The dredge footprint is located >25' from salt marsh or >100' from vegetated shallows; and
   d. Combined permanent and temporary impacts that are (i) ≤1,000 SF in mudflats or natural rocky habitat, or (ii) ≤5,000 SF within intertidal habitat and areas containing shellfish (an area contains shellfish unless: it is verified that minimal shellfish are present per the local shellfish constable or a shellfish survey; or it is not mapped as a MassGIS shellfish suitability area).
   e. No return water from upland disposal areas.

2. Boulder relocation with ≤1,000 SF of impacts, relocated to a similar depth and substrate.

Pre-Construction Notification Required

1. Maintenance dredging where the primary purpose is sand mining for beach nourishment.

2. New dredging and associated disposal ≤1/2 acre or <10,000 cubic yards.

3. Improvement dredging.

4. Beach nourishment in waters of the U.S. not associated with dredging.

5. Activities that are located in saltmarsh and tidal vegetated shallows.

6. Dredging in a Federal Navigation Project or within the buffer zone (see GC 15).

7. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See Section VII for definitions of improvement and maintenance dredging.
2. For PCN activities, the USACE may waive or adjust the time of year requirement on a case-by-case basis after consultation with resource agencies.
3. Disposal site of any dredged material must be identified prior to obtaining USACE authorization.
4. Contact the USACE if a ten-year authorization to maintain an area is desired.

[1] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

GP 8. U.S. COAST GUARD APPROVED BRIDGES (Authorities: §404)

Discharges of dredged or fill material incidental to the construction and modification of bridges across navigable waters of the U.S., including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills provided that the USCG authorizes the construction of the bridge structure under Section 9 of the Rivers and Harbors Act of 1899 or other applicable laws. A USCG Authorization Act Exemption or a Surface Transportation and Uniform Relocation Assistance Act (STURRA) (144h) exemption do not constitute USCG authorization.

Not authorized under GP 8 (IP Required): Causeways and approach fills (see GP 23).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Discharges of dredged or fill material that are incidental to the construction of bridges across navigable waters and meet all of the following: a. Combined permanent and temporary impacts that are ≤5,000 SF. b. Combined permanent and temporary impacts that are ≤1,000 SF in mudflats and natural rocky habitat. c. Not located in saltmarsh and tidal vegetated shallows.	1. Activities on USACE properties & USACE controlled easements.2. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. GP 8 is not applicable to bridges over inland waters or wetlands that are not tidally influenced or regulated as navigable under Section 10.
2. See eligibility criteria for GPs 2 & 23 for projects that are not subject to USCG regulations.

GP 9. BANK AND SHORELINE STABILIZATION (Authorities: §10 & §404)

Bank stabilization activities necessary for erosion protection along the banks of lakes, ponds, streams, estuarine and ocean waters, and any other open waters. Includes bulkheads, seawalls, riprap, revetments, living seawalls, or slope protection & similar structures, specifically for the purpose of shoreline protection. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.

Activities must meet the following criteria: (a) No material is placed in excess of the minimum needed for erosion protection; (b) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the U.S.; (c) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas); (d) Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization; (e) The activity is not a stream channelization activity; and (f) The activity must be properly maintained, which may require repairing it after severe storms or erosion events. This GP authorizes those maintenance and repair activities if they require authorization. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the bank stabilization activity. See GP 20 for living shoreline stabilization structures or fills.

Not authorized under GP 9 (IP required): (a) New bank stabilization >500 feet in total length (>1,000 linear feet in total length when necessary to protect transportation infrastructure) or permanent loss of saltmarsh >1,000 SF, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects (an exception is for bulkheads – the district engineer cannot issue a waiver for a new bulkhead that is >1,000 feet in length along the bank); (b) Stream channelization or relocation activities; or (c) Breakwaters, groins or jetties.

Self-Verification Eligible

1. Activities in tidal and non-tidal waters that are:
   a. <200 feet in length.
   b. <400 feet in length when necessary to protect transportation infrastructure.
   c. ≤1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Not located in non-tidal wetlands, saltmarsh, vegetated shallows.

Pre-Construction Notification Required

1. Activities in tidal and non-tidal waters that are:
   a. ≥200 feet to ≤500 feet in total length. Activities >500 feet in total length must have a written waiver from USACE.
   b. ≥400 feet to ≤1,000 feet in total length when necessary to protect transportation infrastructure. Activities >1,000 feet in total length must have a written waiver from USACE.
   c. >1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Located in non-tidal wetlands, saltmarsh, vegetated shallows.
2. Activities with permanent loss of tidal or non-tidal waters that is (a) ≥5,000 SF or (b) ≥1,000 SF in mudflats and natural rocky habitat.
3. Activities that are (a) located in the Connecticut River or Merrimack River and/or (b) require installation of steel piles/steel sheet piles that cannot be done in the dry where NOAA ESA-listed species are mapped as present.
4. Activities on USACE properties & USACE-controlled easements.
5. Activities that require grouted riprap and/or poured/unformed concrete.
6. Activities that are not eligible for SV and do not require an IP.

Note: The applicant shall comply with GC 24. This includes utilization of bioengineering techniques in lieu of hard armoring to the maximum extent practicable as site conditions allow.

GP 10. AQUATIC HABITAT RESTORATION, ENHANCEMENT, AND ESTABLISHMENT ACTIVITIES (Authorities: §10 and §404)

Activities for the restoration, enhancement and establishment of non-tidal and tidal wetlands and riparian areas, including invasive, non-native or nuisance species control; the restoration and enhancement of non-tidal streams and other non-tidal open waters; the relocation of non-tidal waters, including non-tidal streams & associated wetlands for reestablishment of a natural stream morphology and reconnection of the floodplain; the restoration and enhancement of shellfish, finfish and wildlife; and the rehabilitation or enhancement of tidal streams, tidal wetlands and tidal open waters; provided those activities result in net increases in aquatic resource functions and services. See GP 9 for bank and shoreline stabilization. See GP 20 for living shorelines.

Not authorized under GP 10 (IP required): Stream channelization activities and artificial reefs.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are ≤5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting ≤100 SF in tidal waters.	1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are >5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting >100 SF in tidal waters. 3. Permanent water impoundments, dam removal, fish ladders, or tide gates. 4. Stream relocation, impoundment, or loss of streambed occurs. 5. Runneling projects with the purpose of restoring saltmarsh by removing excess water that ponds on the saltmarsh surface. 6. The conversion of: (a) a stream or natural wetlands to another aquatic habitat type (e.g., stream to wetland or vice versa, wetland to pond, etc.) or uplands, (b) one wetland type to another (e.g., forested wetland to an emergent wetland). 7. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving permanent or temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species. 8. Activities on USACE properties & USACE-controlled easements. 9. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type.
2. See RGL 18-01 for guidance on removal of obsolete dams and other structures from rivers and streams. https://www.usace.army.mil/missions/civil-works/regulatory-program-and-permits/guidance-letters/
3. An ecological reference site may be used for a design basis of the restoration activity. The reference site should possess characteristics of an intact aquatic habitat or riparian area that exists in the region. The reference site shall represent the target habitat type of the proposed activity. A reference site may be required at the discretion of USACE.

GP 11. FISH AND WILDLIFE HARVESTING AND ATTRACTION DEVICES AND ACTIVITIES (Authorities: §10 and §404)

Fish and wildlife harvesting and attraction devices and activities in waters of the U.S. such as pound nets, crab traps, crab and shellfish dredging, eel pots, lobster traps, duck blinds, clam and oyster digging, fish aggregating devices, and small fish attraction devices such as open-water fish concentrators (sea kites, etc.).

Not authorized under GP 11 (IP required): Artificial reefs; or new, or expansions of, impoundments and semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area >½ acre.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤1/2 acre, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. Fish and wildlife harvesting and attraction devices and activities that do not require a PCN or IP.	1. Pound nets, impoundments or semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area ≤½ acre, fish aggregating devices, or small fish attraction devices. 2. Devices and activities that are located in tidal vegetated shallows, mud flats, or saltmarsh. 3. Devices and activities that do not require an IP.

Note: An SVN submittal to USACE is not required for work authorized under GP 11.

GP 12. RESPONSE OPERATIONS, OIL AND HAZARDOUS SUBSTANCES (Authorities: §10 & §404)

(a) Activities conducted in response to a discharge or release of oil and hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) including containment, cleanup, and mitigation efforts, provided that the activities are done under either: (i) The Spill Prevention, Control and Countermeasure Plan required by 40 CFR 112.3; (ii) The direction or oversight of the Federal on-scene coordinator designated by 40 CFR 300; or (iii) Any approved existing State, regional or local contingency plan provided that the Regional Response Team concurs with the proposed response efforts or does not object to the response effort; (b) Activities required for the cleanup of oil releases in waters of the U.S. from electrical equipment that are governed by EPA's polychlorinated biphenyl (PCB) spill response regulations at 40 CFR 761; (c) Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention; and (d) The use of structures and fills for spill response training exercises. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities are conducted in accordance with (a) or (b) above that are not planned or scheduled, but an emergency response (see Note 1). 2. Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention. 3. Temporary impacts for spill response training exercises ≤5000 SF in non-tidal waters and ≤1000 SF in tidal waters with no impacts to wetlands, saltmarsh, mudflats, or vegetated shallows. 4. Temporary structures in tidal waters with no impacts to wetlands, saltmarsh, mudflats, vegetated shallows, or riffle and pool complexes and in place ≤30 days.	1. Activities (a) or (b) above are planned or scheduled, not an emergency response; or 2. Activities that are not eligible for SV and do not require an IP.

Notes:

1. For emergency response activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, Merrimack River from the Essex Dam to the mouth, and remaining tidal waters that are not rivers, the permittee must contact the USACE at (978) 318-8338 before or as soon as possible after the work authorized under GP 12(a) - (c) commences for the USACE to address effects under the Endangered Species Act.
2. An SVN submittal to USACE is not required for booms used for spill prevention, or properly contained and cleaned de minimus oil or hazardous substance discharges into navigable waters of the U.S.

GP 13. CLEANUP OF HAZARDOUS AND TOXIC WASTE (Authorities: §10 and §404)

Specific activities required to affect the containment, stabilization, or removal of hazardous or toxic waste materials, including court ordered remedial action plans or related settlements, which are performed, ordered or sponsored by a government agency with established legal or regulatory authority.

Not authorized under GP 13: (a) Establishment of new disposal sites; or (b) Expansion of existing sites used for the disposal of hazardous or toxic waste.

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in vegetated shallows and riffle and pool complexes.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, and (b) located in vegetated shallows and riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters or navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, or loss of streambed occurs. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation to the maximum extent practicable.
2. Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA, are not required to obtain permits under Section 404 of the CWA or Section 10 of the Rivers and Harbors Act.

GP 14. SCIENTIFIC MEASUREMENT DEVICES (Authorities: §10 and §404)

Scientific measurement devices for measuring and recording scientific data, such as staff gauges, tide and current gauges, meteorological stations, water recording and biological observation devices, water quality testing and improvement devices, and similar structures. Also eligible are small weirs and flumes constructed primarily to record water elevation, flow and/or velocity. Upon completion of the use of the device to measure and record scientific data, the measuring device and any other structures or fills associated with that device (e.g., foundations, anchors, buoys, lines, etc.) must be removed to the maximum extent practicable and the site restored to preconstruction elevations.

Not authorized under GP 14 (IP required): (a) Permanent impacts that are >5,000 SF in tidal and non-tidal waters of the U.S.; >1000 SF in tidal saltmarsh, mud flats, riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows. 3. Temporary, non-biological sampling devices in waters that do not restrict or concentrate movement of aquatic organisms and will not adversely affect the course, condition, or capacity of a waterway for navigation. 4. Scientific measurement devices, and small weirs and flumes constructed primarily to record water quantity and velocity provided the discharge of fill is limited to 25 cubic yards. These cannot obstruct or restrict the waterway course, condition, capacity, and location. 5. Temporary measuring devices and associated structures (e.g., anchors, buoys, etc.) in tidal and non-tidal waters that do not require a PCN or IP.	1. Biological sampling devices, weirs or flumes, or the activity restricts or concentrates movement of aquatic organisms. 2. Permanent towers located in navigable waters that record and measure scientific data. 3. Devices that are not eligible for SV and do not require an IP.

Note: An SVN submittal to USACE is not required for temporary measuring devices with a footprint of <10 SF, with a profile of <3 feet high measured from the substrate and located in water deeper than -10 feet MLW.

GP 15. SURVEY ACTIVITIES (Authorities: §10 and §404)

Survey activities such as soil borings, core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, sample plots or transects for wetland delineations, and historic resources surveys.

Not authorized under GP 15 (IP required): (a) Permanent impacts that are >1 acre in tidal and non-tidal waters; >1000 SF in tidal saltmarsh, mud flats, or riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows.	1. Exploratory trenching (see Note 2) occurs in waterways (e.g., streams, tidal waters). 2. Activities associated with the recovery of historic resources, and the drilling and discharge of excavated material from test wells for oil and gas exploration. 3. Seismic exploratory operations occur in tidal waters, the Connecticut River from the Turners Falls Dam to the MA/CT border, or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. An SVN submittal is not required for wetland delineations, and core sampling conducted for preliminary evaluation of dredge project analysis.
2. For the purposes of GP 15, the term “exploratory trenching” means mechanical land or underwater clearing of the upper soil profile to expose bedrock or substrate for the purpose of mapping or sampling the exposed material.
3. The discharge of drilling mud and cuttings may require a permit under §402 of the CWA.

GP 16. LAND AND WATER-BASED RENEWABLE ENERGY GENERATION FACILITIES (Authorities: §10 and §404), AND HYDROPOWER PROJECTS (Authority: §10 and §404)

Structures and work in tidal waters and discharges of dredged or fill material into tidal and non-tidal waters for the construction, expansion, modification or removal of: (a) Land-based renewable energy production facilities (e.g., solar, wind, biomass, geothermal) and their attendant features; (b) Water-based wind or hydrokinetic renewable energy generation projects and their attendant features; and (c) Discharges of dredged or fill material associated with hydropower projects. Attendant features may include, but are not limited to, land-based collection and distribution facilities, control facilities, and parking lots. For each single and complete project in (b) above, no more than 10 generation units (e.g., wind turbines or hydrokinetic devices) are authorized in navigable waters of the U.S. Upon completion of the pilot project (see note 2), the generation units, transmission lines, and other structures or fills associated with the pilot project must be removed to the maximum extent practicable.

Not authorized under GP 16 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters, >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) >5000 SF, or (b) located in vegetated shallows or riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters. 3. Water-based wind or hydrokinetic renewable energy generation projects, and hydropower projects. 4. For all activities eligible for authorization under GP 16: a. The activity occurs in tidal waters or in, over or under navigable waters. b. Stream channelization, relocation, impoundment, or loss of streambed occurs. 5. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Utility lines constructed to transfer the energy from the land-based renewable generation or collection facility to a distribution system, regional grid, or other facility may be authorized by GP 6.
2. For the purposes of this GP, the term “pilot project” means an experimental project where the renewable energy generation units will be monitored to collect information on their performance and environmental effects at the project site.

GP 17. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL DEVELOPMENTS AND RECREATIONAL FACILITIES (AUTHORITIES: §404)

Discharges of dredged or fill material into non-tidal waters for the construction or expansion of: (a) Residences and residential subdivisions; (b) Residential, commercial and institutional building foundations and building pads; and (c) Recreational facilities such as playgrounds, playing fields, bikeways, trails, etc. This GP also authorizes attendant features that include, but are not limited to, roads, parking lots, garages, yards, and utility lines, and stormwater management facilities. This GP authorizes attendant features if they are necessary for the use of the project purpose.

Not authorized under GP 17 (IP required): (a) Permanent impacts that result in loss of non-tidal waters >1/2 acre; >1000 SF in riffle and pool complexes or vegetated shallows; or (b) Subsurface sewerage disposal systems in non-tidal waters.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) <5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≥5,000 SF, or (b) located in riffle and pool complexes or non-tidal vegetated shallows.
2. Stream channelization or relocation resulting in loss of streambed that is <200 LF.	2. Stream and wetland crossings that require a PCN per GCs 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings.
	3. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind.
	4. Activities on USACE properties & USACE-controlled easements.
	5. Activities that are not SV eligible and do not require an IP.

Notes:

1. Stream and wetland crossings (permanent and temporary), including those built with construction mats; and modifications (including sliplining), replacements or extensions to existing crossings.
2. See GC 22 for information on temporary construction mats.
3. Subdivisions: For residential subdivisions, the aggregate total loss of waters of United States authorized by this GP cannot exceed 1/2-acre. This includes any loss of waters of the United States associated with development of individual subdivision lots.

GP 18. AQUACULTURE (Authorities: §10 and §404)

(a) The installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the U.S.; (b) Discharges of dredged or fill material into tidal and non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities; and (c) Shellfish seeding or brushing the flats projects. Any fill material imported to the project from offsite (this is limited to mineral growth medium used in culture trays) shall be clean and of comparable grain size to the native substrate. Activities authorized under this GP must have (a) their MA DMF Aquaculture Certificate letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.

Not authorized under GP 18 (IP required): (a) New, or expansions of, impoundments and semi-impoundments of tidal and non-tidal waters for the culture or holding of motile species such as lobster with an impounded area >½ acre; (b) Cultivation of a nonindigenous species (see Note 1) unless that species has been previously cultivated in the waterbody; (c) Cultivation of an aquatic nuisance species (see Note 1); (d) Attendant features such as docks, piers, boat ramps (see GP 4); (e) stockpiles, staging areas, or the deposition of shell material back into tidal and non-tidal waters as waste.

Self-Verification Eligible

1. In tidal waters, a new lease site area is (a) ≤2-acre, (b) not located in salt marsh, natural rocky habitat, or tidal vegetated shallows.

2. In tidal waters, *expansions* of existing lease sites not to exceed 2 acres for the entire site (e.g. 1 acre lease site increasing to a 2 acre lease site may qualify as SV). A PCN is required for expansions in salt marsh, natural rocky habitat, and tidal vegetated shallows.

3. Cages, racks that are elevated ≥2 feet above the ocean floor with legs within a lease site with ≤4 buoys marking the corners.

4. Floating cage strings with a single connecting line, ≤2 anchors and ≤2 end marker buoys per string within a lease site with ≤4 buoys marking the corners.

5. No activities located within 25 feet of tidal vegetated shallows.

6. Culture only indigenous species.

7. Not located in FNP or within a distance of three times the authorized depth of an FNP (see GC 15).

8. Not located in or impinge upon the value of any National Lands or Federal Properties.

9. Floating upweller docks that total ≤600 SF in area.

Pre-Construction Notification Required

1. Discharges of fill material associated with aquaculture >5,000 SF.

2. Research, educational, commercial-viability or experimental aquaculture gear activities >1,000 SF.

3. Kelp or finfish aquaculture.

4. Land-based hatchery intakes >3 inches in diameter.

5. Activities in water depths >10 feet mean low lower water (MLLW).

6. Activities with in-water lines, ropes or chains that are not SV eligible (see #3-4).

7. Activities occur in the Connecticut River from the Turners Falls Dam to the MA/CT border or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species.

8. New, or expansions of, impoundments and semi-impoundments for the culture or holding of motile species such as lobster with an impounded area ≤1/2 acre.

9. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.

Note: The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 defines: (a) nonindigenous species as “any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another”; and (b) aquatic nuisance species as “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters.”

GP 19. MINING ACTIVITIES (Authorities: §10 and §404)

Discharges of dredged or fill material into non-tidal waters for mining activities, except for coal mining and metallic mineral mining activities.

Not authorized under GP 19 (IP required): (a) Permanent impacts >1 acre in non-tidal waters; or (b) Activities in tidal waters.

Self-Verification Eligible	Pre-Construction Notification Required
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes, non-tidal vegetated shallows, and streams.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes, non-tidal vegetated shallows, and streams. 2. The activity occurs in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or discharge of tailings into streams occurs. 4. Work on USACE properties & USACE-controlled easements. 5. Activities that are not eligible for SV and do not require an IP.

GP 20. LIVING SHORELINES[1] (Authorities: §10 and §404)

Construction and maintenance of living shorelines to stabilize banks and shores in tidal waters. In non-tidal waters that are not subject to the ebb and flow of the tide, nature-based bank stabilization techniques such as bioengineering and vegetative stabilization may be authorized by GP 9. This GP authorizes those maintenance and repair activities in-kind that are necessary to address changing environmental conditions.

The following terms must be met for both SVs and PCNs as applicable: (a) Coir logs, coir mats, stone, native oyster shell, native wood debris, and other structural materials must be adequately anchored, of sufficient weight, or installed in a manner that prevents relocation in most wave action or water flow conditions, except for extremely severe storms; (b) For living shorelines consisting of tidal fringe wetlands, native plants appropriate for current site conditions, including salinity and elevation, must be used if the site is planted by the permittee; (c) Discharges of dredged or fill material into waters of the U.S., and oyster or mussel reef structures in navigable waters, must be the minimum necessary for the establishment and maintenance of the living shoreline; (d) If sills or other structural materials per PCN #4 must be constructed to protect fringe wetlands for the living shoreline, those structures must be the minimum size necessary to protect those fringe wetlands; (e) The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water and sediment movement between the waterbody and the shore and the movement of aquatic organisms between the waterbody and the shore; and (f) The living shoreline must be properly maintained and monitored, which may require periodic repair of sills, bioengineered components, or replacing sand fills after severe storms or erosion events. Vegetation may be replanted to maintain the living shoreline.

Not authorized under GP 20 (IP required): (a) The activity is ≥1000 feet in length along the bank (≥2000 LF both banks) unless waived by the District Engineer; or (b) The activity is >30 feet channel ward of mean low water in tidal waters; or (c) Upland reclamation activities; or (d) Stream channelization or relocation activities; or (e) Breakwaters, groins, jetties, or artificial reefs; or (f) Permanent impacts >1,000 SF in existing saltmarsh; >100 SF in existing tidal vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Tidal and non-tidal living shorelines ≤100 LF for each bank (≤200 LF for both banks). 2. Combined permanent and temporary impacts ≤5,000 SF in tidal waters, excluding existing salt marsh, tidal vegetated shallows, natural rocky habitat, and mudflats.	1. Tidal and non-tidal living shorelines >100 LF to <1000 LF (>200 LF to <2000 LF for both banks). 2. Permanent and temporary impacts in existing salt marsh, tidal vegetated shallows, or mudflats. 3. Work on USACE properties & USACE-controlled easements. 4. Use of stone sills, native oyster shell, native wood debris, or other structural materials.

Notes:

1. PCNs require monitoring for a minimum of 5 years in accordance with an approved restoration plan, unless otherwise determined by the USACE. The first year of monitoring will be the first year that the site has been through a full growing period after completion of construction and planting.
2. Applicants are encouraged to obtain a MEPA certificate prior to submitting a USACE permit application.

[1] A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes. Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures.

GP 21. AGRICULTURAL ACTIVITIES (Authority: §404)

Discharges of dredged or fill material in non-tidal waters for agricultural activities, including the construction of building pads for farm buildings. Authorized activities include: (a) installation, placement, or construction of drainage tiles, ditches, or levees; mechanized land clearing; land leveling; the relocation of existing serviceable drainage ditches; and similar activities; (b) construction of farm ponds, excluding perennial streams, provided the farm pond is used solely for agricultural purposes; and (c) discharges of dredged or fill material to relocate existing serviceable drainage ditches constructed in non-tidal streams.

Not authorized under GP 21 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters; or >1000 SF in riffle and pool complexes, or non-tidal vegetated shallows; (b) Work in tidal waters; or (c) Construction of farm ponds in perennial streams.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes and non-tidal vegetated shallows. 2. Activities occur in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or farm ponds in non-perennial streams occurs. 4. Activities that are not eligible for SV and do not require an IP.

Note: Some discharges for agricultural activities may qualify for an exemption under Section 404(f) of the CWA (see 33 CFR 323.4). This GP authorizes the construction of farm ponds that do not qualify for the CWA §404(f)(1)(C) exemption because of the recapture provision at §404(f)(2).

GP 22. RESHAPING EXISTING DRAINAGE DITCHES, CONSTRUCTION OF NEW DITCHES, AND MOSQUITO MANAGEMENT (Authorities: §10 and §404)

Discharges to modify the cross-sectional configuration of currently serviceable drainage ditches constructed in tidal and non-tidal waters, for the purpose of improving water quality by regrading the drainage ditch with gentler slopes, which can reduce erosion, increase growth of vegetation, and increase uptake of nutrients and other substances by vegetation. Also authorized are mosquito reduction activities.

Not authorized under GP 22 (IP required): Stream channelization, relocation, impoundments, or loss of streambed.

Self-Verification Eligible	**Pre-Construction Notification Required**
≤500 linear feet of drainage ditch will be reshaped provided excavated material is deposited in an upland area.	1. >500 linear feet of drainage ditch will be reshaped, excavated material is deposited in a water of the U.S., or the reshaping of the ditch increases the drainage capacity beyond the original as-built capacity or expands the area drained by the ditch as originally constructed (i.e., the capacity of the ditch is not the same as originally constructed or drains additional wetlands or other waters of the U.S.). 2. Permanent and temporary impacts in tidal vegetated shallows. 3. New ditches or relocation of drainage ditches constructed in waters of the U.S. (i.e., the location of the centerline of the reshaped drainage ditch is not approximately the same as the location of the centerline of the original drainage ditch). 4. Activities that are not eligible for SV and do not require an IP.

Note: Some ditch activities are exempt under Section 404(f) of the CWA (see 33 CFR 323.4).

GP 23. LINEAR TRANSPORTATION PROJECTS AND WETLAND/STREAM CROSSINGS (Authorities: §10 & §404)

Activities[1] required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., driveways, roads, highways, railways, trails, airport runways, and taxiways) and attendant features. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats (see Note 1), necessary to construct the linear transportation project.

Not authorized under GP 23 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars (see GP 17); or (d) New tide gates.

Self-Verification Eligible

1. In non-tidal waters, the combined permanent and temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows; and c) meet the Massachusetts River and Stream Crossing Standards

2. Existing crossings (e.g., culverts, elliptical or arch pipes, etc.) are not modified by (a) decreasing the diameter of the crossing or (b) changing the friction coefficient, such as through slip lining (retrofitting an existing culvert by inserting a smaller diameter pipe), culvert relining or invert lining.

3. Stream channelization or relocation resulting in loss of streambed that is <200 LF.

Pre-Construction Notification Required

1. In non-tidal waters, the combined permanent and temporary impacts are a) >5,000 SF; b) located in vegetated shallows or riffle and pool complexes; or c) do not meet the Massachusetts River and Stream Crossing Standards (see note 4).

2. The activity occurs in tidal waters, salt marsh, or in, over or under navigable waters of the U.S.

3. Stream and wetland crossings that require a PCN per GC 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings.

4. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind.

5. Work on USACE properties & USACE-controlled easements.

6. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See GC 22 for information on temporary construction mats.
2. Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the U.S. may be authorized under GP 8.
3. Loss of streambed does not require a PCN when bridge piers or similar supports are used.
4. In their PCN application submission to the USACE, applicants must explain why they are unable to meet the Massachusetts River and Stream Crossing Standards.
5. For tidal crossings, modeling is encouraged as a method to verify the proposed crossing would not be undersized and resilient to the effects of sea level rise.

[1] Stream crossings must conform with the MA Stream Crossing Guidelines when practicable and comply with all applicable GCs of this document (Section IV).

GP 24. TEMPORARY CONSTRUCTION, ACCESS, AND DEWATERING (Authorities: §10 and §404)

Temporary structures, work, and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites that are not authorized under another GP activity.

Not authorized under GP 24 (IP required): (a) Permanent structures or impacts; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Use of cofferdams to dewater wetlands or other aquatic areas to change their use; (d) Temporary stream crossings (see GPs 6, 17, 23); (e) Structures or fill left in place after construction is completed.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) ≤5,000 SF, b) ≤1,000 SF in mudflats and/or natural rocky habitat, and c) not located in saltmarsh and tidal vegetated shallows. 3. Structures in navigable waters of the U.S. provided impacts do not require a PCN and they are left in place ≤30 days.	1. In non-tidal waters, temporary impacts are a) >5,000 SF; b) located in riffle and pool complexes or non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) >5,000 SF; b) >1,000 SF in mudflats and/or natural rocky habitat, or (c) located in saltmarsh and tidal vegetated shallows. 3. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species; or 4. Activities not eligible for SV and do not require an IP.

Notes:

1. Turbidity or sediment resuspension is generally not considered to occur when properly using management techniques to work in dry conditions. See GC 25.
2. Total impact areas under SV Eligible 1-2 exclude use of temporary construction mats. See GC 22 for information on temporary construction mats.
3. An SVN submittal to USACE is not required for SV #3 above.

GP 25. EMERGENCY SITUATIONS (Authorities: §10 and §404)

Structures or work in or affecting navigable waters of the U.S. and the discharge of dredged or fill material into waters of the U.S., including wetlands, necessary for repair or protection measures associated with an emergency situation[1], MassDEP Emergency Declaration/Certification, or FEMA Declared Disaster. The activity shall be the minimum necessary to alleviate the immediate emergency unless that additional work would result in no more than minimal effects to aquatic environment and is necessary to reduce the potential for future failure or loss of the structure or site. Typical activities authorized under this GP include, but are not limited to, restoration of damaged areas; bank stabilization; temporary fills for staging, access, and dewatering; and, repair, replacement, or rehabilitation of existing structures and/or fills (i.e., roads, bridges, utility pipelines and flood control structures, including attendant features, and other existing structures located in waters of the U.S.).

For the restoration of areas damaged by storms floods, or other discrete events: (a) The restored area must not extend waterward of the ordinary high-water mark or high tide line that existed prior to the damage. (b) The slope of the restored area below the ordinary high-water mark or high tide line must not exceed the slope that existed prior to the damage. (c) The bottom elevation of the restored area must not exceed the bottom elevation that existed prior to the damage (i.e., the restored area must not result in a reduction in the depth of the waterbody that existed prior to the damage). (d) Except in cases of FEMA reimbursement, the activity must be initiated, under contract to commence, or funds shall be allocated for the activity within 30 days of authorization under GP 25.

Not authorized under GP 25 (IP required): (a) Permanent impacts for a single and complete project >1/2 acre in tidal waters, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects; >1,000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >5,000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1,000 SF in vegetated shallows; (c) New structures or fills that did not previously exist before the storm event or other discrete event (see other GPs).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities that qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) and/or receive an Emergency Certification pursuant to 310 CMR 10.06 and/or meet the requirements of 314 CMR 9.12(2) or (3); and 2. Activities eligible under a FEMA Declared Disaster that also comply with #1 above.	1. Activities that are eligible under a FEMA Declared Disaster and do not qualify under SV #1. 2. Minor deviations in the structure or fill area, including those to existing structures or fills are authorized due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to alleviate the emergency. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Review the GCs (Section IV) to confirm if a PCN is not required elsewhere in this document.
2. If the activity is not a MassDEP Emergency Declaration/Certification, does not meet the requirements of 314 CMR 9.12(2) or (3), or is not a FEMA Declared Disaster, applicants must explain in writing why their activity qualifies as an emergency (see footnote) to be eligible under GP 25.
3. SV eligible activities qualify under the general 401 WQC MassDEP issued for the 2023 MA GPs (GC 9).

[1] An emergency, as determined by this office and 33 CFR 325.2(e)(4), is one which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a Department of the Army permit is not undertaken within a time period less than the normal time to process the request under standard processing procedures.

SECTION IV. GENERAL CONDITIONS:

To qualify for GP authorization, the applicant must comply with the following general conditions, as applicable, in addition to authorization-specific conditions imposed by the division or district engineer.

1. Other Permits
2. Federal Jurisdictional Boundaries
3. Single and Complete Projects
4. Use of Multiple General Permits
5. Suitable Material
6. Tribal Rights & Burial Sites
7. Avoidance, Minimization, and Compensatory Mitigation
8. Water Quality & Stormwater Management
9. Coastal Zone Management
10. Federal Threatened and Endangered Species
11. Essential Fish Habitat
12. National Lands
13. Wild and Scenic Rivers
14. Historic Properties
15. USACE Property and Federal Projects (§408)
16. Navigation
17. Permit/Authorization Letter On-Site
18. Storage of Seasonal Structures
19. Pile Driving and Pile Removal in Navigable Waters
20. Time of Year Restrictions
21. Heavy Equipment in Wetlands
22. Temporary Fill & Construction Mats
23. Restoration of Wetland Areas
24. Bank Stabilization
25. Soil Erosion and Sediment Controls
26. Aquatic Life Movements and Management of Water Flows
27. Spawning, Breeding, and Migratory Areas
28. Vernal Pools
29. Invasive Species
30. Fills Within 100-Year Floodplains
31. Stream Work and Crossings & Wetland Crossings
32. Utility Line Installation and Removal
33. Water Supply Intakes
34. Coral Reefs
35. Blasting
36. Inspections
37. Maintenance
38. Property Rights
39. Transfer of GP Verifications
40. Modification, Suspension, and Revocation
41. Special Conditions
42. False or Incomplete Information
43. Abandonment
44. Enforcement Cases
45. Previously Authorized Activities
46. Duration of Authorization

1. Other Permits. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law. Permittees are responsible for obtaining all required permits, approvals, or authorizations. Activities that are not regulated by the State, but subject to USACE jurisdiction, may still be eligible for these GPs.

2. Federal Jurisdictional Boundaries.
a. Applicability of these GPs shall be evaluated with reference to Federal jurisdictional boundaries. Activities shall be evaluated with reference to "waters of the U.S." under the CWA (33 CFR 328) and "navigable waters of the U.S." under §10 of the Rivers and Harbors Act of 1899 (33 CFR 329). Permittees are responsible for ensuring that the boundaries used satisfy the Federal criteria defined at 33 CFR 328-329. These sections prescribe the policy, practice, and procedures to be used in determining the extent of the USACE jurisdiction. Note: Waters of the U.S. includes all waters pursuant to 33 CFR 328.3(a), and adjacent wetlands as the term is defined in 33 CFR 328.3(c).
b. Wetlands shall be delineated in accordance with the USACE Wetlands Delineation Manual and the most recent Northcentral/Northeast Regional Supplement. Wetland delineation and jurisdiction information is located at: www.nae.usace.army.mil/missions/regulatory/jurisdiction-and-wetlands and maps are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
c. Vegetated shallows shall be delineated when present on the project site. Vegetated shallow survey guidance and maps are located at: www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
d. Natural rocky habitats shall be delineated when present on the project site. The definition of natural rocky habitats is in Section VII of the MA GP. Natural rocky habitat survey guidance and maps are located at: www.nae.usace.army.mil/ missions/regulatory/state-general-permits/massachusetts-general-permit.

3. Single and Complete Projects. The MA GP shall not be used for piecemeal work and shall be applied to single and complete projects. The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers.
a. For non-linear projects, a single and complete project must have independent utility. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed, even if the other phases were not built, can be considered as separate single and complete projects with independent utility.
b. Unless USACE determines the activity has independent utility, all components of a single project and/or all planned phases of a multi-phased project (e.g., subdivisions should include all work such as roads, utilities, and lot development) shall be evaluated as one single and complete project.
c. For linear projects such as power lines or pipelines with multiple crossings, a "single and complete project" is all crossings of a single water of the U.S. (i.e., single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately. If any crossing requires a PCN review or an individual permit review, then the entire linear project shall be reviewed as one project under PCN or the individual permit procedures.

4. Use of Multiple General Permits. The use of more than one GP for a single and complete project is prohibited, except when the acreage loss of waters of the U.S. authorized by the GPs does not exceed the acreage limit of the GPs with the highest specified acreage limit. For example, if a road crossing over waters is constructed under GP 23, with an associated utility line

crossing authorized by GP 6, if the maximum acreage loss of waters of the U.S. for the total project is ≥1 acre it shall be evaluated as an IP.

5. Suitable Material & Discharge of Pollutants. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). All activities involving any discharge into waters of the U.S. authorized under these GPs shall be consistent with applicable water quality standards, effluent limitations, standards of performance, prohibitions, and pretreatment standards and management practices established pursuant to the CWA (33 U.S.C. 1251), and applicable state and local laws. If applicable water quality standards, limitations, etc., are revised or modified during the term of this GP, the authorized work shall be modified to conform with these standards within six months from the effective date of such revision or modification, or within a longer period of time deemed reasonable by the District Engineer in consultation with the Regional Administrator of the EPA. Unless monitoring data indicates otherwise, applicants may presume that their activity complies with state water quality standards provided they are in compliance with the Section 401 WQC (Applicable only to the Section 404 activity).

6. Tribal Rights & Burial Sites

a. For all SV and PCN applications, prospective permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

c. Many tribal resources are not listed on the National Register of Historic Places (NRHP) and may require identification and evaluation in collaboration with the identifying tribe and by qualified professionals. The Tribal Historic Preservation Officer (THPO) and State Historic Preservation Officer (SHPO) may be able to assist with locating information on:

i. Previously identified tribal resources; and
ii. Areas with potential for the presence of tribal resources.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the appropriate the Federal, Tribal, and state coordination required to determine if the items or remains are eligible for listing in the NRHP and warrant a recovery effort or can be avoided.

e. Burial Sites: Burial sites, marked or unmarked, are subject to state law (Massachusetts Unmarked Burial Law). Native American burial sites on federal or tribal land are subject to the provisions of Native American Graves Protection and Repatriation Act (NAGPRA). Regulated activities may not result in disturbance or removal of human remains until disposition of the remains has been determined by the appropriate authority under these laws, and the work is authorized by the USACE. Regulated activities which result in an inadvertent discovery of human remains must stop immediately, and the USACE, as well as the appropriate state and tribal authority, must be notified. Regulated work at inadvertent discovery sites requires compliance with state law or NAGPRA, as appropriate, prior to re-starting work.

7. Avoidance, Minimization, and Compensatory Mitigation. To qualify under the MA GP, activities must comply with Section V Mitigation Standards and the following as applicable:

a. Avoid and Minimize: Activities must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the U.S. to the maximum extent practicable at the project site. Avoidance and minimization are required to the extent necessary to ensure that the adverse effects to the aquatic environment (both area and function) are no more than minimal.

b. Compensatory mitigation for unavoidable impacts to waters of the U.S., including direct, indirect, secondary, and temporal loss, will generally be required for permanent impacts that exceed the thresholds identified in Section V, and may be required for temporary impacts, to offset unavoidable impacts which remain after all appropriate and practicable avoidance and minimization has been achieved and to ensure that the adverse effects to the aquatic environment are no more than minimal. Proactive restoration projects or temporary impact work with no secondary effects may generally be excluded from this requirement.
c. Mitigation proposals shall follow the guidelines found in the Compensatory Mitigation for Losses of Aquatic Resources; Final Rule April 10, 2008; 33 CFR 332. Prospective permittees may purchase mitigation credits in-lieu of permittee-responsible mitigation as compensation for unavoidable impacts to waters of the U.S. in the Commonwealth of Massachusetts.

8. Water Quality & Stormwater Management. The 401 WQC requirement applies to all activities listed under GPs 1-25, unless determined otherwise by MassDEP. Permittees shall also satisfy stormwater management requirements in Massachusetts.

a. General 401 WQC: MassDEP issued a WQC on April 21, 2023 which conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of the WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC. Prospective permittees may refer to the following link to determine if their activity is eligible: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/ Massachusetts-General-Permit/. The General 401 WQC is located here, and it provides detailed information regarding what activities are certified and the conditions for certification. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.
b. Individual 401 WQC: Prospective permittees shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the prospective permittee shall submit their Individual 401 WQC application concurrently to MassDEP and USACE to comply with 40 CFR 121.
c. The prospective permittee is responsible for determining the appropriate 401 WQC requirement and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Prospective permittees that are unsure of whether their activity has been certified should contact MassDEP for a determination.
d. As applicable, all activities shall be compliant with the Massachusetts Stormwater Handbook. The Stormwater Handbook can be accessed on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. No work requiring authorization under Section 404 of the CWA may be performed unless (1) the prospective permittee qualifies for coverage under the April 21, 2023 General 401 WQC, (2) the prospective permittee receives an individual Section 401 WQC from the MassDEP, or (3) the MassDEP waives individual Section 401 WQC.

9. Coastal Zone Management. The permittee must obtain CZM consistency concurrence when an activity is located in the coastal zone in order to be eligible under the MA GP. This requirement

shall be satisfied by acquiring one of the following from the Massachusetts Office of Coastal Zone Management (MA CZM):

a. General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25. The prospective permittee must obtain all applicable permits and approvals before construction of the authorized activity begins (e.g., before work begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the prospective permittee. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review.
b. Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 and require Individual Concurrence. The prospective permittee must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.
c. Permittees must obtain CZM consistency concurrence as outlined above before commencing work authorized under these GPs.

10. Federal Threatened and Endangered Species

a. No activity is authorized under any GP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any GP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."
b. Other Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If a PCN is required for the proposed activity, the Federal permittee must provide USACE with the appropriate documentation to demonstrate compliance with those requirements. The USACE will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.
c. USFWS ESA-Listed Species: Non-federal applicants shall use the USFWS website, Information for Planning and Consultation (IPAC), to determine if their activity is located within the ESA-listed species range. The IPAC website can be accessed on the NAE Regulatory website: https://www. nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Applicants shall ensure they have an updated, valid species list before construction begins. This may require applicants to update their species list in IPAC before the start of construction. Note: Applicants should refer to the NAE Regulatory Website at the link above to determine if they have been designated as a non-federal representative. Applicants shall complete Section 7 consultation according to the guidance document located on the NAE Regulatory Website. After completing the Rangewide Determination Key and reaching the outcome "may affect, not likely to adversely affect", you may be required to wait up to 15 days before that outcome is final and compliance under Section 7 of the ESA is fulfilled.

i. *Self-Verification Criteria*: The activity is SV-eligible if:
   1) The activity is not located within the ESA-listed species range;
   2) Another (lead) Federal agency has completed Section 7 consultation; or
   3) The activity is located within the ESA-listed species range ***and*** USACE has designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all

species within the project's action area. As the non-federal representative, the applicant shall complete consultation through IPAC and reach the outcome of "no effect" or "not likely to adversely affect".

ii. *Pre-Construction Notification Criteria*: The activity requires a PCN if:

1) The activity is located within the ESA-listed species range ***and*** USACE has NOT designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all species within the project's action area;

2) The activity is located in designated or proposed critical habitat; or

3) The activity is located within the ESA-listed species range and completion of the IPAC determination key has resulted in the outcome of "may affect" or "may affect, likely to adversely affect"; or

4) A PCN is required elsewhere in this document.

d. NOAA-Listed Species: Non-federal applicants shall refer to the Section 7 Mapper for federally listed species to determine if any species are mapped as present. When NOAA-listed species are present, the applicant shall generate a species report through the mapper and submit this document as part of their PCN or SVN submission. The NOAA Fisheries' Section 7 Mapper can be accessed here on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

e. Authorization of an activity by an GP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

11. Essential Fish Habitat (EFH).

a. SV eligible activities have been determined to result in no more than minimal adverse effects, provided the permittee complies with all terms and conditions of the MA GP as appliable to the activity. NMFS has granted General Concurrence [50 CFR 600.920(g)] for all SV eligible activities. These activities do not require project specific EFH consultation.

b. For PCN required activities, the applicant is required to describe and identify potential adverse effects to EFH and should refer to NOAA Fisheries' EFH Mapper (http://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper) and Omnibus Essential Fish Habitat Amendment 2 Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts (https://www.habitat.noaa.gov/application/efhmapper/oa2_efh_hapc.pdf). If an activity is located within EFH, the PCN application must contain:

1. A description of the action located in EFH.
2. An analysis of the potential adverse effects of the action on EFH and the managed Species.
3. Conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable (refer to the mitigation thresholds located in Section V).

c. Federal agencies shall follow their own procedures for complying with the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act. For activities requiring a PCN, the applicant is responsible for furnishing documentation that demonstrates consultation for EFH has been completed.

d. For PCN activities, no work may commence until EFH consultation as required by the Magnuson-Stevens Act has been completed.

12. National Lands. Activities that impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, National Historic Landmarks or any other area administered by the National Park Service, U. S. Fish and Wildlife Service (USFWS) or U.S. Forest Service (USFS) require a PCN or Individual Permit. Federal land managers seeking authorization for activities located in the above listed National Lands may proceed under SV, unless a PCN is required elsewhere in this document.

13. Wild and Scenic Rivers. The following activities in designated river or study river segments in the National Wild and Scenic River (WSR) System require a PCN unless the Federal agency with direct management responsibility for such river, in Massachusetts this is generally the National Park Service, has determined in writing to the proponent that the proposed work will not adversely affect the WSR designation or study status:

a. Activities that occur in WSR segments, in and 0.25 miles up or downstream of WSR segments, or in tributaries within 0.25 miles of WSR segments;
b. Activities that occur in wetlands within 0.25 miles of WSR segments;
c. Activities that have the potential to alter free-flowing characteristics in WSR segments.

No GP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

As of May 10, 2023, affected rivers in Massachusetts include: the Taunton River (40 miles), Sudbury River (16.6 miles), Assabet River (4.4 miles), Concord River (8 miles), Nashua River (27 miles), Squannacook River (16.3 miles), Nissitissit River (4.7 miles), and the Westfield River, including West Branch, Middle Branch, Gendale Brook, East Branch, Drowned Land Brook, Center Brook, Windsor Jambs Brook, Shaker Mill Brook, Depot Brook, Savery Brook, Watson Brook, Center Pond Brook (78.1 miles). The most up to date list of designated and study rivers and their descriptions may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

14. Historic Properties

a. For all SV and PCN applications, permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No undertaking authorized by these GPs shall cause effects[1] (defined in 36 CFR Part 800 and 33 CFR Part 325, Appendix C, and its Interim Guidance) on properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places (NRHP)[2], including previously unknown historic properties within the permit area, unless the USACE or another Federal action agency has satisfied the consultation requirements of Section 106 of the National Historic Preservation Act (Section 106). If another Federal agency is determined the lead federal agency for compliance with Section 106, applicant must obtain the appropriate documentation and provide this information to the USACE to demonstrate compliance with Section 106. The applicant shall not begin the activity until the USACE notifies them in writing that the documentation provided satisfies Section 106 requirements.

[1] Effect means the alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register of Historic Properties.
[2] See the NAE Regulatory website, National Register of Historic Places link here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

c. Many historic properties are not listed on the NRHP and may require identification and evaluation by qualified historic preservation and/or archaeological consultants. The State Historic Preservation Officer (SHPO), Massachusetts Board of Underwater Archaeological Resources (BUAR), local historical societies, certified local governments, general public, and NRHP may also be able to assist with locating information on:

i. Previously identified historic properties; and
ii. Areas with potential for the presence of historic properties.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the Federal, State and tribal coordination required to determine if the items or remains warrant a recovery effort and/or if the site is eligible for listing in the National Register of Historic Places.

e. Section 110k: Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. § 306113) prevents the USACE from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106, has intentionally significantly adversely effected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the USACE, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the USACE is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties effected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or effects historic properties on tribal lands or effects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

f. Underwater Archaeological Resources: Under Massachusetts General Law Ch. 6, s.'s 179-180, and Ch. 91, s. 63, the BUAR has statutory jurisdiction within state waters and is the sole trustee of the Commonwealth's underwater heritage, charged with the responsibility of encouraging the discovery and reporting, as well as the preservation and protection, of underwater archaeological resources. Underwater archaeological resources located within the waters of the Commonwealth of Massachusetts are property of the Commonwealth, which holds title to these resources and retains regulatory authority over their use. Under Massachusetts General Law, no person, organization or corporation may "remove, displace, damage, or destroy" any underwater archaeological resources located within the Commonwealth's submerged lands except through consultation with the BUAR and in conformity with the permits it issues. https://www.mass.gov/orgs/board-of-underwater-archaeological-resources.

15. USACE Property and Federal Projects. (33 USC §408)

a. USACE projects and property can be found at: https://www.nae.usace.army.mil/Missions/Civil-Works/.

b. In addition to any authorization under these GPs, prospective permittee shall contact the USACE Real Estate Division (https://www.nae.usace.army.mil/Missions/Real-Estate-Division/) at (978) 318-8585 for work occurring on or potentially affecting USACE properties and/or USACE-controlled easements. Work may not commence on USACE properties and/or USACE-controlled easements until they have received any required USACE real estate documents evidencing site-specific permission to work.

c. Any proposed temporary or permanent occupation or alteration of a Federal project (including, but not limited to, a levee, dike, floodwall, channel, anchorage, breakwater, seawall, bulkhead, jetty, wharf, pier, or other work built or maintained but not necessarily owned by the United States),

is not eligible for SV and requires a PCN. This includes all proposed structures and work in, over, or under a USACE federal navigation project (FNP) or in the FNP's buffer zone. The buffer zone is an area that extends from the horizontal limits of the FNP to a distance of three times the FNP's authorized depth. The activity also requires review and approval by the USACE pursuant to 33 USC 408 (Section 408 Permission). The prospective permittee may reach out to the POCs located here: https://www.nae.usace.army.mil/ Missions/Section-408/.
d. Any structure or work constructed in a FNP or its buffer zone shall be subject to removal at the owner's expense prior to any future USACE dredging or the performance of periodic hydrographic surveys.
e. Where a Section 408 permission is required, written verification for the PCN will not be issued prior to the decision on the Section 408 permission request.

16. Navigation
a. No activity may cause more than a minimal adverse effect on navigation.
b. Any safety lights and signals prescribed by the U.S. Coast Guard, must be installed, and maintained at the permittee's expense on authorized facilities in navigable waters of the U.S.
c. There shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein, and no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized herein.
d. The permittee understands and agrees that if future U.S. operations require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from USACE, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the U.S. No claim shall be made against the U.S. on account of any such removal or alteration.

17. Permit/Authorization Letter On-Site. For PCNs, the permittee shall ensure that a copy of these GPs and the accompanying authorization letter are at the work site (and the project office) whenever work is being performed, and that all personnel with operational control of the site ensure that all appropriate personnel performing work are fully aware of its terms and conditions. The entire permit authorization shall be made a part of any and all contracts and sub-contracts for work that affects areas of USACE jurisdiction at the site of the work authorized by these GPs. This shall be achieved by including the entire permit authorization in the specifications for work. The term "entire permit authorization" means these GPs, including GCs and the authorization letter (including its drawings, plans, appendices, special conditions, and other attachments), and any permit modifications. If the authorization letter is issued after the construction specifications, but before receipt of bids or quotes, the entire permit authorization shall be included as an addendum to the specifications. If the authorization letter is issued after receipt of bids or quotes, the entire permit authorization shall be included in the contract or sub-contract as a change order. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be obligated by contract to comply with all environmental protection provisions contained within the entire authorization letter, and no contract or sub-contract shall require or allow unauthorized work in areas of USACE jurisdiction. For SVs, the permittee shall ensure that a complete and signed copy of the SVN is present on site during construction and is made available for review at any time by USACE and other Federal, State, & Local regulatory agencies. A complete and signed copy of the SVN must be submitted to USACE Regulatory within 30 days of initiating construction of the authorized activity, unless stated otherwise in the applicable GP.

18. Storage of Seasonal Structures. Coastal structures such as pier sections, floats, etc., that

are removed from the waterway for a portion of the year (often referred to as seasonal structures) shall be stored in an upland location, located above MHW and not in tidal wetlands. These seasonal structures may be stored on the fixed, pile-supported portion of the structure that is seaward of MHW. This is intended to prevent structures from being stored on the marsh substrate and the substrate seaward of MHW.

19. Pile Driving and Pile Removal in Navigable Waters.
a. Derelict, degraded or abandoned piles and sheet piles in navigable waters of the U.S., except for those inside existing work footprints for piers, must be completely removed, cut and/or driven to 3 feet below the substrate to prevent interference with navigation, and existing creosote piles that are affected by project activities shall be completely removed if practicable. In areas of fine-grained substrates, piles must be removed by the direct, vibratory or clamshell pull method[1] to minimize sedimentation and turbidity impacts and prevent interference with navigation from cut piles. Removed piles shall be disposed of in an upland location landward of MHW or OHW and not in wetlands, tidal wetlands or mudflats.
b. A PCN is required for the installation or removal of structures with jetting techniques.
c. A PCN is required for the installation of >12 inch-diameter piles of any material type or steel piles of any size in tidal waters, unless they are installed in the dry. If piles are not installed in the dry:
i. Impact pile driving shall commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one minute waiting periods, before initiating continuous impact driving.
ii. Vibratory pile driving shall be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period shall be repeated two more times, followed immediately by pile-driving at full rate and energy.
iii. In addition to using a soft start at the beginning of the workday for pile driving as described in 19c(i-ii), a soft start must also be used at any time following a cessation of pile driving for a period of 30 minutes or longer.
d. Bubble curtains may be used to reduce sound pressure levels during vibratory or impact hammer pile driving.

20. Time-of-Year (TOY) Restrictions. Activities that include in-water work must comply with the TOY Restrictions below to be SV eligible, otherwise a PCN is required. PCN submittals shall contain written justification for deviation from the TOY Restrictions. The term “in-water work” does not include conditions where the work site is “in-the-dry” (e.g., intertidal areas exposed at low tide). The term “in-the-dry” includes work contained within a cofferdam so long as the cofferdam is installed and subsequently removed outside the TOY Restriction. The TOY restrictions stated in Appendix B of the MA DMF Technical Report TR-47[2] can apply instead for activities in tidal waters if (1) TOYs are provided for a specific waterbody where the activity is proposed and (2) the TOYs are less restrictive than below. The activity must also not require a PCN elsewhere in this document to be SV eligible.

[1] Direct Pull: Each piling is wrapped with a choker cable or chain that is attached at the top to a crane. The crane then pulls the piling directly upward, removing the piling from the sediment. Vibratory Pull: The vibratory hammer is a large mechanical device (5-16 tons) that is suspended from a crane by a cable. The vibrating hammer loosens the piling while the crane pulls up. Clamshell Pull: This can remove intact, broken or damaged pilings. The clamshell bucket is a hinged steel apparatus that operates like a set of steel jaws. The bucket is lowered from a crane and the jaws grasp the piling stub as the crane pulls up. The size of the clamshell bucket is minimized to reduce turbidity during piling removal.
[2] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

	TOY Restriction (No work)
Non-tidal Waters	Defer to TR-47
Tidal Waters	January 15 – November 15

Alternate work windows proposed under a PCN will generally be coordinated with the USFWS and NMFS. Resulting written verifications may include species-specific work allowed windows.

21. Heavy Equipment in Wetlands. Operating heavy equipment (drill rigs, fixed cranes, etc.) within wetlands shall be minimized, and such equipment shall not be stored, maintained, or repaired in wetlands, to the maximum extent practicable. Where construction requires heavy equipment operation in wetlands, the equipment shall:

i. Have low ground pressure (typically ≤3 psi);

ii. Be placed on swamp/construction/timber mats (herein referred to as "construction mats" or "mats") that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation. See GC 22 for information on the placement of construction mats; or

iii. Be operated on adequately dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath the equipment and upheaval of adjacent wetlands. Construction mats are to be placed in the wetland from the upland or from equipment positioned on mats if working within a wetland. Dragging construction mats into position is prohibited. Other support structures that are capable of safely supporting equipment may be used with written USACE authorization.

22. Temporary Fill, Work & Construction Mats.

a. *Construction mats in non-tidal waters*: Temporary construction mats shall be in place ≤1 year *and* for one growing season or less to be SV eligible. A PCN is required if construction mats are in place >1 year *or* for more than one growing season. Construction mats can be placed in an area of any size in non-tidal waters. The activity may occur in segments to ensure the requirements for SV above are met, otherwise a PCN is required.

b. *Construction mats in tidal waters*: Temporary construction mats placed in an area <5,000 SF in tidal waters are SV eligible, provided those mats are in place ≤6 months. Temporary construction mats placed in an area ≥5,000 SF or in place >6 months in tidal waters require a PCN.

c. *Management of construction mats:* At a minimum, construction mats shall be managed in accordance with the following construction mat best management practices (BMPs):

1. Mats shall be in good condition to ensure proper installation, use, and removal.
2. As feasible, mats shall be placed in a location that will minimize the amount of mats needed for the wetland crossing(s).
3. Inspect mats prior to their re-use and remove any plant debris. Mats are to be thoroughly cleaned before re-use to prevent the spread of invasive plant species.
4. Impacts to wetland areas shall be minimized during installation, use, and removal of the mats.
5. Adequate erosion & sediment controls shall be installed at approaches to mats to promote a smooth transition to, and minimize sediment tracking onto, the mats.
6. In most cases, mats should be placed along the travel area so that the individual boards are resting perpendicular to the direction of traffic. No gaps should exist between mats. Place mats far enough on either side of the resource area to rest on firm ground.

d. A PCN is required for temporary fills in place >2 years. All temporary fills and disturbed soils shall be stabilized to prevent the material from eroding into waters of the U.S. where it is not authorized. Work shall include phased or staged development to ensure only areas under active development are exposed and to allow for stabilization practices as soon as practicable. Temporary fill must be placed in a manner that will prevent it from being eroded by expected high flows.

e. Activities that require unconfined temporary fill and are authorized for discharge into waters of the U.S. shall consist of material that minimizes effects to water quality.
f. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Materials shall be placed in a location and manner that does not adversely impact surface or subsurface water flow into or out of the wetland. Temporary fill authorized for discharge into wetlands shall be placed on geotextile fabric or other appropriate material laid on the pre-construction wetland grade where practicable to minimize impacts and to facilitate restoration to the original grade. Construction mats are excluded from this requirement.
g. Construction debris and deteriorated materials shall not be located in waters of the U.S.
h. Temporary fills, construction mats, and corduroy roads shall be entirely removed as soon as they are no longer needed to construct the authorized activity and the disturbed areas be restored to pre-construction contours and conditions.
i. Construction equipment, such as temporary barges in tidal waters, shall provide clearance above the substrate to avoid grounding onto the substrate during all tides.

23. Restoration of Wetland Areas.
a. Upon completion of construction, all disturbed wetland areas shall be stabilized with a wetland seed mix or plant plugs containing only plant species native to New England, and be appropriate for site conditions, including salinity and frequency of inundation, and shall not contain any species listed in the “Invasive and Other Unacceptable Plant Species” Appendix K of the New England District “Compensatory Mitigation Standard Operating Procedures” found at https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
b. The introduction or spread of invasive plant species in disturbed areas shall be prevented and controlled. Equipment shall be thoroughly cleaned before and after project construction to prevent the spread of invasive species. This includes, but is not limited to, tire treads and construction mats.
c. In areas of authorized temporary disturbance, if trees are cut in USACE jurisdiction, they shall be cut at or above ground level and not uprooted in order to prevent disruption of any kind to the wetland soil structure and to allow stump sprouts to revegetate the work area, unless otherwise authorized.
d. Wetland areas where permanent disturbance is not authorized shall be restored to their original condition and elevation, which under no circumstances shall be higher than the pre-construction elevation. Original condition means careful protection and/or removal of existing soil and vegetation, and replacement back to the original location such that the original soil layering and vegetation schemes are approximately the same, unless otherwise authorized.

24. Bank Stabilization.
a. Projects involving construction or reconstruction/maintenance of bank stabilization within USACE jurisdiction shall be designed to minimize environmental effects, effects to neighboring properties, scour, conversion of natural shoreline to hard armoring, etc. to the maximum extent practicable.
b. Projects involving the construction of new bank stabilization within USACE jurisdiction shall use bioengineering techniques and natural materials in the project design to the maximum extent practicable. Use of hard structures shall be eliminated or minimized unless the prospective permittee can demonstrate that use of bioengineering techniques is not practicable due to site conditions.
c. Where possible, bank stabilization projects shall optimize the natural function of the shoreline, including self-sustaining stability to attenuate flood flows, fishery, wildlife habitat and water quality protection, while protecting upland infrastructure from storm events that can cause erosion as well as impacts to public and private property.
d. No material shall be placed in excess of the minimum needed for erosion protection.
e. No material shall be placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas).

f. Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization.
g. The activity must be properly maintained, which may require repairing it after severe storms or erosion events.

25. Soil Erosion and Sediment Controls.
a. Appropriate soil erosion and sediment controls[1] (hereinafter referred to as "controls") must installed prior to earth disturbance and maintained in effective operating condition during construction. Biodegradable wildlife friendly erosion controls should be used whenever practicable to minimize effects to water quality.
b. Activities in streams (rivers, streams, brooks, etc.) and tidal waters that are capable of producing sedimentation or turbidity should be done during periods of low-flow or no-flow, when the stream or tide is waterward of the work area. Controls may also be used to obtain dry work conditions (e.g., coffer dam, turbidity curtain). The prospective permittee must demonstrate in the project plans where the controls are proposed and how these controls would avoid and/or minimize turbidity or sedimentation.
c. A PCN is required for controls that encroach: i) >25% of the stream width measured from OHW in non-tidal diadromous streams from March 15 to June 30; or ii) >25% of the waterway width measured from MHW in tidal waters from Feb. 1 to June 30, or >50% of the waterway width measured from MHW in tidal waters from July 1 to Jan. 14. This is to protect upstream fish passage. Proponents must also maintain downstream fish passage throughout the project.
d. No dewatering shall occur with direct discharge to waters or wetlands. Excess water in isolated work areas shall be pumped or directed to a sedimentation basin, tank or other dewatering structures in an upland area adequately separated from waters or wetlands. Suspended solids shall be removed prior to discharge back into waters or wetlands from these dewatering structures. All discharge points back into waters and wetlands shall use appropriate energy dissipaters and erosion and sedimentation control BMPs.
e. Temporary controls shall be removed upon completion of work, but not until all exposed soil and other fills, as well as any work waterward of OHW or the HTL, are permanently stabilized at the earliest practicable date. Sediment and debris collected by these devices shall be removed and placed at an upland location in a manner that will prevent its later erosion into a waterway or wetland. Controls may be left in place if they are biodegradable and flows and aquatic life movements are not disrupted.

26. Aquatic Life Movements and Management of Water Flows.
a. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies and wetlands shall be:

i. Suitably spanned, bridged, culverted, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species; and
ii. Properly aligned and constructed to prevent bank erosion or streambed scour both adjacent to and inside the crossing.

[1] Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.

b. To avoid adverse impacts on aquatic organisms, the low flow channel/thalweg shall remain unobstructed during periods of low flow, except when necessary to perform the authorized work.
c. For work in tidal waters, in-stream controls (e.g., cofferdams) should be installed in such a way as to not obstruct fish passage.
d. Riprap and other stream bed materials shall be installed in a manner that avoids organism entrapment in rock voids or water displaced to subterranean flow with crushed stone and riprap.
e. To the maximum extent practicable, the preconstruction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity shall not restrict or impede the passage of normal or high flows unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

27. Spawning, Breeding, and Migratory Areas.
a. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized under these GPs.
b. Activities in waters of the U.S. that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.
c. The applicant is responsible for obtaining any "take" permits required under the USFWS's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The applicant should contact the appropriate local office of the USFWS to determine if such "take" permits are required for a particular activity.
d. Information on spawning habitat for species managed under the Magnuson-Stevens Fishery Conservation and Management Act (i.e., EFH for spawning adults) can be obtained from NAE Regulatory website, Essential Fish Habitat section, at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. Information regarding diadromous fish habitat can be obtained from the following DMF website at: https://www.mass.gov/info-details/massgis-data-diadromous-fish.

28. Vernal Pools.
a. A PCN is required if a discharge of dredged or fill material is proposed within a vernal pool depression that is also a water of the U.S.
b. Vernal pools must be identified on the plans that show aquatic resource delineations.
c. Adverse impacts to vernal pools shall be avoided & minimized to the maximum extent practicable.

29. Invasive Species.
a. The introduction, spread or the increased risk of invasion of invasive plant or animal species on the project site, into new or disturbed areas, or areas adjacent to the project site caused by the site work shall be avoided. Construction mats shall be thoroughly cleaned before reuse to avoid spread of invasive species.
b. Unless otherwise directed by USACE, all applications for PCN non-tidal projects proposing fill in USACE jurisdiction shall include an Invasive Species Control Plan. Additional information can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/Invasive-Species/, https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/.

30. Fills Within 100-Year Floodplains. The activity shall comply with applicable Federal Emergency Management Agency (FEMA) approved, Massachusetts Emergency Management

Agency (MEMA) approved and/or local floodplain management requirements. Applicants should contact FEMA and/or MEMA regarding floodplain management requirements.

31. Stream Work and Crossings & Wetland Crossings.
a. When feasible, all temporary and permanent crossings of waterbodies and wetlands (hereinafter referred to as "crossings") shall conform to the "Massachusetts River and Stream Crossing Standards" located at: https://www.mass.gov/doc/massachusetts-river-and-stream-crossing-standards/download or https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Projects that do not conform to these guidelines shall be reviewed under PCN or IP procedures.
b. Crossings shall be suitably culverted, bridged, or otherwise designed to withstand and to prevent the restriction of high flows, to maintain existing low flows, maintain water quality, and not obstruct the movement of aquatic life indigenous to the waterbody beyond the duration of construction.
c. Crossings shall be installed in such a manner as to preserve hydraulic capacity and flow, sediment transport, and organism passage at its present level, between the wetlands on either side of the road. The applicant shall take necessary measures to correct any wetland damage resulting from deficiencies in hydraulic capacity, sediment transport and organism passage.
d. Stream crossings shall utilize a natural mixed grain-size streambed material composition that matches upstream and downstream substrates to create a stable streambed. Substrate should function appropriately during normal and high flows without washing out. If natural streambed material is not utilized, a PCN is required.
e. Activities involving open trench excavation in flowing waters require a PCN. Work should not occur in flowing waters (requires using management techniques such as temporary flume pipes, culverts, cofferdams, etc.). Normal flows should be maintained within the stream boundary's confines when practicable. Projects utilizing these management techniques must meet all applicable terms and conditions of the GP, including the GCs in Section IV.

32. Utility Line Installation and Removal
a. Subsurface utility lines must be installed at a sufficient depth to avoid damage from anchors, dredging, etc., and to prevent exposure from erosion and stream adjustment.
b. When utility lines are installed via horizontal directional drilling, a frac-out contingency plan shall be present on site for the duration of construction. As necessary, the applicant shall immediately contain, control, recover, and remove drilling fluids released into the environment.
c. Abandoned or inactive utility lines must be removed and faulty lines (e.g., leaking hazardous substances, petroleum products, etc.) must be removed or repaired. A written verification from the USACE is required if they are to remain in place, e.g., to protect sensitive areas or ensure safety.
d. Utility lines shall not adversely alter existing hydrology, and trenches cannot be constructed or backfilled in such a manner as to drain waters of the U.S. (e.g., backfilling with extensive gravel layers, creating a French drain effect). In wetland areas, structures such as ditch plugs, cut-off walls, clay blocks, bentonite, or other suitable material shall be used within utility trenches to ensure that the trench through which the utility line is installed does not drain waters of the U.S. including wetlands.
e. Stockpiling of tree debris, to the extent where it has the effect of fill material, shall not occur in waters of the U.S. Tree debris shall be removed from waters of the U.S. and placed in uplands without causing additional disturbance to aquatic resources. Failure to meet this condition could change the bottom elevation of the wetland and be considered a discharge of fill material, and depending on the area of alteration, may require a PCN or IP.

33. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

34. Coral Reefs. Impacts to coral reefs are not authorized under these GPs. Coral reefs consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef.

35. Blasting. Blasting in waters of the U.S. associated with work such as dredging, trenching, pile installation, etc. is not authorized under these GPs.

36. Inspections. The permittee shall allow USACE to make periodic inspections at any time deemed necessary to ensure that the work is being or has been performed in accordance with the terms and conditions of this permit. To facilitate these inspections, for activities requiring a PCN, the permittee shall complete and return the Certificate of Compliance when it is provided with a PCN verification letter. For SV-eligible activities, the permittee shall complete and submit the SVN to USACE within 30 days of initiating project construction, at which point, USACE may opt to inspect the activity to verify compliance with the terms and conditions of the GP. Post-construction engineering drawings may be required by USACE for completed work. This includes post-dredging survey drawings for any dredging work.

37. Maintenance. The permittee shall maintain the activity authorized by these GPs in good condition and in conformance with the terms and conditions of this permit. Some maintenance activities may not be subject to federal regulation under Section 404 in accordance with 33 CFR 323.4(a)(2). This condition is not applicable to maintenance of dredging projects. Prospective permittees should contact USACE to inquire about maintenance of dredging projects, and its eligibility under these GPs. Maintenance dredging is subject to the review thresholds in GP #7 as well as any conditions included in a written USACE authorization. Maintenance dredging includes only those areas and depths previously authorized and dredged.

38. Property Rights. Per 33 CFR 320.4(g)(6), these GPs do not convey any property rights, either in real estate or material, or any exclusive privileges, nor do they authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations.

39. Transfer of GP Verifications. When the work authorized by these GPs is still in existence at the time the property is transferred, the terms and conditions of these GPs, including any special conditions, will continue to be binding on the entity or individual who received the GP authorizations, as well as the new owner(s) of the property. If the permittee sells the property associated with a GP authorization, the applicant may transfer the GP authorization to the new owner by submitting a letter to USACE to validate the transfer. A copy of the GP authorization letter must be attached to the letter, and the letter must include the following statement: “The terms and conditions of these general permits, including any special conditions, will continue to be binding on the new owner(s) of the property.” This letter shall be signed by both the seller and new property owner(s).

40. Modification, Suspension, and Revocation. These GPs and any individual authorization issued thereof may be either modified, suspended, or revoked in whole or in part pursuant to the policies and procedures of 33 CFR 325.7; and any such action shall not be the basis for any claim for damages against the U.S.

41. Special Conditions. The USACE may impose other special conditions on a project authorized pursuant to these GPs that are determined necessary to minimize adverse navigational and/or environmental effects or based on any other factor of the public interest. Failure to comply with all conditions of the authorization, including special conditions, constitutes a permit violation and may subject the applicant to criminal, civil, or administrative penalties or restoration.

42. False or Incomplete Information. If USACE makes a determination regarding the eligibility of a project under these GPs, and subsequently discovers that it has relied on false, incomplete, or inaccurate information provided by the applicant, the authorization will not be valid, and the U.S. Government may institute appropriate legal proceedings.

43. Abandonment. If the permittee decides to abandon the activity authorized under these GPs, unless such abandonment is merely the transfer of property to a third party, he/she/they may be required to restore the area to the satisfaction of USACE.

44. Enforcement cases. These GPs do not apply to any existing or proposed activity in USACE jurisdiction associated with an on-going USACE or EPA enforcement action, until such time as the enforcement action is resolved or USACE or EPA determines that the activity may proceed independently without compromising the enforcement action.

45. Previously Authorized Activities.

a. Completed projects that received prior authorization from USACE (SV or PCN), shall remain authorized in accordance with the original terms and conditions of those authorizations, including their terms, GCs, and any special conditions provided in a written verification.

b. Activities authorized pursuant to 33 CFR 330.3 (activities occurring before certain dates) are not affected by these GPs.

46. Duration of Authorization.

These GPs expire on June 1, 2028. Activities authorized under these GPs will remain authorized until the GPs expire, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 325.2(e)(2). Activities authorized under GPs 1-25 that have either commenced (i.e., are under construction) or are under contract to commence in reliance upon this authorization will have until June 1, 2029 to complete the work. If requested by USACE, the permittee shall furnish documentation that demonstrates the project was under construction or under contract to commence by June 1, 2028. If work is not completed before June 1, 2029, the permittee must contact USACE. The USACE may issue a new authorization provided the project meets the terms and conditions of the MA GPs in effect at the time. Activities completed under the SV or PCN authorizations of these GPs will continue to be authorized after their expiration date.

SECTION V: MITIGATION STANDARDS

1. Mitigation Types

For all activities, applicants must (a) demonstrate how the project has been designed to avoid or minimize impacts to aquatic resources; and (b) describe measures taken to avoid or minimize impacts to aquatic resources through construction techniques and/or site access. Please see https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/ for assistance with preparing mitigation in accordance with the 2008 Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR 332.3), hereafter referred to as "2008 Mitigation Rule."

Avoidance - Avoidance of impacts (direct and indirect) to aquatic resources means that project activities would not result in the placement of fill material or installation of a structure that could impact the resource area. Avoidance can include, but is not limited to, designing the project to avoid impacts to all or a portion of the aquatic resource areas.

Minimization - Minimization of impacts (direct and indirect) to aquatic resources means that measures are taken to ensure the amount and duration of impacts are limited to the maximum extent practicable. There are many minimization measures that could be implemented, prior to, during, or after the proposed activity, to ensure impacts are minimized. Examples include, but are not limited to:

- Permanent preservation of avoided aquatic features and buffer zone, in perpetuity. In these cases, the preserved area would be under a conservation easement and managed by conservation oriented third-party manager.
- Utilization of best management practices (BMPs) to ensure impacts are limited, and do not result in adverse impacts to the integrity and long-term functions of preserved/avoided features.

Compensatory Mitigation - Compensatory mitigation is generally required for PCN activities in which the impacts to the aquatic resources have been avoided and minimized to the maximum extent practicable but would still result in unavoidable adverse effects to the environment that are considered more than minimal or are contrary to the public interest. *Whatever the case may be, compensatory mitigation is no substitute for avoidance and minimization.*

2. Thresholds for Compensatory Mitigation

The basic objective of compensatory mitigation in the USACE Regulatory Program is to offset environmental losses resulting from unavoidable impacts to waters of the U.S. authorized by Department of the Army permits. **The following compensatory mitigation thresholds apply to all PCN activities that result in loss[1] of the resource area types listed below. Activities[2] in waters of the U.S. associated with the restoration, enhancement, and establishment of tidal and non-tidal aquatic resources are not considered loss and are not subject to the thresholds below.** Thresholds for different resource areas may not be combined to exceed 5,000 SF of total loss of all waters. The USACE will continue to evaluate projects on a case-by-case basis, and may in some cases require compensatory mitigation below these thresholds (e.g. minor impacts that add to a cumulative loss).

[1] See definition of loss in Section VII.
[2] These activities must result in net increases in aquatic resource functions and services to be exempted from the thresholds above.

Compensatory Mitigation Thresholds in Massachusetts		
Resource Area	**Non-Tidal Threshold**	**Tidal Threshold**
Stream	200 LF	200 LF
Bank Stabilization	500 LF	500 LF
Open Water	Project Dependent	Project Dependent
Wetland	5,000 SF	500 SF
Vernal Pool	All	N/A
SAV	Project dependent	25 SF
Mudflat	N/A	1,000 SF
Intertidal	N/A	1,000 SF

These thresholds can be utilized to determine at what point compensatory mitigation is required but are not used to determine how much mitigation may be needed to offset impacts to resources. Per the 2008 Mitigation Rule (33 CFR 332.3(f)(1)) "the amount of required compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions. In cases where appropriate functional or condition assessment methods or other suitable metrics are available, these methods should be used where practicable to determine how much compensatory mitigation is required. If a functional or condition assessment or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratios must be used."

3. Compensatory Mitigation Hierarchy

Compensatory mitigation should follow the hierarchy as outlined in 33 CFR 332.3(b)(2-6) or current regulation. This hierarchy in order of preference includes: (1) Mitigation Bank credits, (2) In-Lieu Fee program credits, (3) permittee-responsible mitigation under a watershed approach, (4) permittee-responsible mitigation through on-site and in-kind mitigation, and (5) permittee-responsible mitigation through off-site and/or out-of-kind mitigation. If the proposed mitigation deviates from this mitigation hierarchy, the applicant **must** justify in writing why the proposed mitigation is environmentally preferable to the preferred method of compensatory mitigation (See 2008 Mitigation Rule). **In order for your application to be considered complete, you must provide a statement that discusses how your project will compensate for the loss or impact to aquatic resources.** If you are proposing permittee responsible mitigation, the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14) must be addressed for your application to be considered complete. Prospective applicants are encouraged to contact USACE with questions at any time. Addressing the 12 components of a mitigation plan is commensurate with the amount of compensatory mitigation required, and USACE can assist prospective applicants with the level of information needed to satisfy each component.

For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee.

4. In-Lieu Fee (ILF)

The purchase of credits from the Massachusetts In-Lieu Fee Program (MA ILFP) is the ***preferred*** method of compensatory mitigation in Massachusetts since, as of the issuance date of this GP, there are no mitigation banks available in Massachusetts. The applicant shall develop a mitigation plan that addresses the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

The MA ILFP is administered by the Massachusetts Department of Fish & Game (DFG) in accordance with the 2008 Mitigation Rule at 33 CFR 332. The Mitigation Rule governs in-lieu fee compensatory mitigation associated with USACE permits under §404 of the Clean Water Act and/or §9 or §10 of the Rivers and Harbors Act of 1899.

MA ILFP Website: https://www.mass.gov/in-lieu-fee-program

Acceptance of an ILF payment into the ILFP established by the 2014 MA ILFP Instrument (link below) is an acknowledgement by DFG that it assumes all legal responsibility for satisfying the mitigation requirements of the USACE (i.e., the implementation, performance, and long-term management and monitoring of the compensatory mitigation project(s) approved under this Instrument and subsequent Compensatory Mitigation Plans). This transfer of legal responsibility is established by: 1) the approval of this In-Lieu Fee Instrument; 2) receipt by the district engineer of a Notice of Credit Sale and Transfer of Legal Responsibility to DFG that is signed by the DFG and the permittee and dated; and 3) the transfer of fees from the permittee to DFG.

MA ILFP Fact Sheet: https://www.mass.gov/files/documents/2017/01/sj/ilfp-fact-sheet-ma-ilfp-fees.pdf

MA ILFP Instrument: https://www.mass.gov/files/documents/2016/08/nd/ilfp-final-instrument-dfg.pdf

5. Permittee-Responsible

The USACE may determine that the proposed permittee-responsible compensatory mitigation is appropriate on a case-by-case basis. As described in the Compensatory Mitigation Hierarchy section above, applicants must justify in writing why the proposed mitigation is environmentally preferable to the purchase of ILF credits. Applicants are encouraged to contact the USACE prior to submission of a permit application to seek further guidance regarding USACE mitigation requirements.

Applicants will demonstrate their proposed compensatory mitigation in writing by addressing the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14). *Please note that all elements must be addressed, or the permit application will be deemed incomplete.* In certain circumstances, the district engineer may determine that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). Guidance on how to address these components can be found on the New England District Mitigation webpage: https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/

Performance standards will be used to measure the successfulness of the mitigation project. A successful mitigation project is one that is self-sustaining. For a mitigation project that will restore, enhance, or create wetlands, proper performance standards must address hydrology, hydric soils, and hydrophytic vegetation. The mitigation proposal must include an explanation of quantitative methods used to measure the success of performance standards (i.e., percent cover may be measured using vegetation plots, hydrology may be measured using data loggers, soil cores may be taken and evaluated for hydric soil indicators).

Monitoring methods should include quantitative sampling methods following established, scientific protocols. Sampling documentation, as part of monitoring reports, should include maps and coordinates (also shapefiles, if available) showing locations of sampling points, transects, quadrats, etc. In addition, permanent photo stations should be established coincident with sampling locations.

SECTION VI: FEDERAL & STATE AGENCY CONTACT INFORMATION & ORGANIZATIONAL WEBSITES

Federal Agencies

U.S. Army Corps of Engineers
Regulatory Division
696 Virginia Road
Concord, Massachusetts 01742-2751
(978) 318-8338 (phone); (978) 318-8303 (fax)
www.nae.usace.army.mil/missions/regulatory

U.S. Army Corps of Engineers
Navigation Division – Section 408
696 Virginia Road
Concord, Massachusetts 01742-2751
See link below for contact information:
https://www.nae.usace.army.mil/Missions/Section-408/

National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930
(978) 281-9300 (phone)
(*Federal endangered species & EFH)*

U.S. Fish & Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301
(603) 223-2541 (phone)
(Federal endangered species)

National Park Service
15 State Street
Boston, Massachusetts 02109
(617) 223-5191 (phone)
(*Wild and Scenic Rivers*)

Bureau of Ocean and Energy Management
1849 C Street, NW
Washington D.C. 20240
202-208-6474 (phone)
(*Offshore Wind Facilities)*

Chief, Risk Analysis Branch
FEMA Region 1
99 High Street, 6th Floor
U.S. Department of Homeland Security
Boston, Massachusetts 02110
(617) 956-7576 (phone)

Commander (dpb)
First Coast Guard District
Battery Building
One South Street
New York, New York 10004-1466
(212) 514-4331 (phone); (212) 514-4337 (fax)
(*Bridge permits*)

U.S. Environmental Protection Agency
5 Post Office Square
Suite 100 (OEP06–3)
Boston, Massachusetts 02109-3912
(617) 918-1692 (phone)

State Agencies in Massachusetts

Massachusetts Department of Environmental Protection (MassDEP)	
DEP Division of Wetlands & Waterways	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 292-5695
Northeast Region	150 Presidential Way, Suite 300 Woburn, Massachusetts 01801 (978) 694-3200
Southeast Region	20 Riverside Drive, Route 105 Lakeville, Massachusetts 02347 (508) 946-2800
Central Region	8 New Bond Street Worcester, Massachusetts 01606 (508) 792-7650
Western Region	436 Dwight Street Springfield, Massachusetts 01103 (413) 784-1100

Massachusetts Office of Coastal Zone Management (CZM) Emails may be sent to: czm@mass.gov	
MA Office of Coastal Zone Management	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1200
North Shore Region	2 State Fish Pier Gloucester, Massachusetts 01930 (978) 281-3972
South Shore Region	175 Edward Foster Road Scituate, Massachusetts 02066
Cape Cod and Islands Region	3195 Main Street, P.O. Box 220 Barnstable, MA 02630
South Coastal Region	81-B County Road, Suite E Mattapoisett, MA 02739

Massachusetts Historical Commission (MHC)	
Office Location:	220 Morrisey Boulevard Boston, Massachusetts 02125 (617) 727-8470

Massachusetts Board of Underwater Archaeological Resources (BUAR) Emails may be sent to: david.s.robinson@mass.gov	
Office Location:	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1014

SECTION VII: Definitions & Acronyms

Artificial or Living Reef: A structure which is constructed or placed in waters for the purpose of enhancing fishery resources and commercial and recreational fishing opportunities.
Attendant Features: Occurring with or as a result of; accompanying.
Biodegradable: A material that decomposes into elements found in nature within a reasonably short period of time and will not leave a residue of plastic or a petroleum derivative in the environment after degradation. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Examples of biodegradable materials include jute, sisal, cotton, straw, burlap, coconut husk fiber (coir) or excelsior. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Photodegradable, UV degradable or Oxo-(bio)degradable plastics are not considered biodegradable under this GP.
Boating facilities: These provide, rent or sell mooring space, such as marinas, yacht clubs, boat yards, dockominiums, municipal facilities, land/home owners, etc. Not classified as boating facilities are piers shared between two abutting properties or municipal mooring fields that charge an equitable user fee based on the actual costs incurred.
Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. Must comply with the applicable provisions of 33 CFR 332. See also the New England District Compensatory Mitigation Guidance at http://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
Construction mats: Constructions, swamp and timber mats (herein referred to as “construction mats”) are generic terms used to describe structures that distribute equipment weight to prevent wetland damage while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes. A timber mat consists of large timbers bolted or cabled together. Corduroy roads, which are not considered to be construction mats, are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another. Corduroy roads are typically installed as permanent structures. Like construction mats, they are considered as fill whether they are installed temporarily or permanently.
Cumulative Impacts: The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.1). Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. See 40 CFR 230.11(g).
Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Dredging:
Improvement Dredging: For the purposes of these GPs, this is dredging deeper than previously authorized by the USACE and dredged under that authorization.
Maintenance Dredging: For the purposes of these GPs, this is dredging from an area previously authorized by the USACE and dredged under that authorization. The USACE may require proof of authorization and dredging. Maintenance dredging typically refers to the routine removal of accumulated sediment to maintain the design depths of serviceable navigation channels, harbors, marinas, boat launches and port facilities. Maintenance dredging is conducted for navigational purposes and does not include any expansion of the previously dredged area. The USACE may

review a maintenance dredging activity as new dredging if sufficient time has elapsed to allow for the colonization of SAS, shellfish, etc.
New Dredging: For the purposes of these GPs, this is a) first time the USACE authorizes dredging of a particular location or b) dredging has not occurred for an extended period of time, and this has allowed for aquatic resources (i.e., eelgrass, shellfish, etc.) to redevelop in the area.
Dredged material & discharge of dredged material: These are defined at 33 CFR 323.2(c) and (d). The term dredged material means material that is excavated or dredged from waters of the U.S.
Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.
Ephemeral stream: A stream with flowing water only during, and for a short duration, after precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.
Erosion Controls: Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.
Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area (33 CFR 332.2).
Expansions: Work that increases the footprint of fill, structures, depth of basin or drainage features, or floats, or slip capacity.
Essential Fish Habitat (EFH): The Federal Magnuson-Stevens Fishery Management and Conservation Act broadly defines EFH to include those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. See www.greateratlantic.fisheries.noaa.gov/habitat for more information.
Fill material & discharge of fill material: Material placed in waters of the U.S. where the material has the effect of either replacing any portion of a water of the U.S. with dry land or changing the bottom elevation of any portion of a water of the U.S. Fill material does not include any pollutant discharged into the water primarily to dispose of waste. These are defined at 33 CFR 323.2 (e) & (f).
Federal navigation projects (FNPs): These areas are maintained by the USACE; authorized, constructed and maintained on the premise that they will be accessible and available to all on equal terms; and comprised of USACE Federal anchorages, Federal channels and Federal turning basins. The buffer zone is equal to three times the authorized depth of a FNP. The following are FNPs in MA and more information, including the limits, is provided at www.nae.usace.army.mil/missions/navigation >> Navigation Projects:

- Andrews River, Harwich, MA
- Aunt Lydia's Cove
- Beverly Harbor
- Boston Harbor
- Buttermilk Bay Channel
- Canapitsit Channel
- Cape Cod Canal
- Chatham Harbor
- Cohasset Harbor
- Cross Rip Shoals, Nantucket Sound
- Cuttyhunk Harbor
- Dorchester Bay and Neponset River
- Duxbury Harbor
- Edgartown Harbor
- Essex River
- Fall River Harbor
- Falmouth Harbor
- Gloucester Harbor and Annisquam River
- Green Harbor
- Hingham Harbor
- Hyannis Harbor
- Ipswich River
- Island End River (Chelsea, MA)
- Kingston Harbor
- Lagoon Pond
- Little Harbor Woods Hole

Lynn Harbor
Malden River
Menemsha Creek
Merrimack River
Mystic River
Nantucket Harbor of Refuge
New Bedford and Fairhaven Harbor
Newburyport Harbor
Oak Bluffs Harbor
Pigeon Cove Harbor
Plymouth Harbor
Pollock Rip Shoals, Nantucket Sound
Provincetown Harbor
Red Brook Harbor
Rockport Harbor
Salem Harbor
Sandy Bay Harbor of Refuge
Saugus River
Scituate Harbor
Sesuit Harbor
Taunton River
Vineyard Haven Harbor
Wareham Harbor
Wellfleet Harbor
Westport River and Harbor
Weymouth Back River
Weymouth Fore and Town Rivers
Winthrop Harbor
Woods Hole Channel

Flume: An open artificial water channel, in the form of a gravity chute, which leads water from a diversion dam or weir alongside a natural flow. A flume can be used to measure the rate of flow.
FNP buffer zone: The buffer zone of a USACE Federal Navigation Project (FNP) is equal to three times the authorized depth of the FNP.
Frac out: During horizontal directional drilling (HDD) operations, drilling fluid travels up the borehole into a pit. When the borehole becomes obstructed or the pressure becomes too great inside the borehole, the ground fractures and fluid escapes to the surface and may affect surface waters.
Ground disturbance: Any activity that compacts, relocates, overturns, removes, mixes, or otherwise disturbs the ground, including under water. Ground disturbance can be caused by the use of hand tools (shovels, pick axe, posthole digger, etc.), heavy equipment (excavators, backhoes, bulldozers, dredgers, trenching and earthmoving equipment, etc.), and heavy trucks (large four wheel drive trucks, dump trucks and tractor trailers, etc.). Trenching, bulldozing, dredging, excavating, scraping, and plowing are typical examples of ground disturbance activities.
Height:width ratio: The height of structures shall at all points be equal to or exceed the width of the deck. For the purpose of this definition, height shall be measured from the marsh substrate to the bottom of the longitudinal support beam.
High Tide Line (HTL): The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides 58 that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds. (33 CFR 328). Refer to the highest predicted tide for the current year at the nearest NOAA tide gage. https://tidesandcurrents.noaa.gov/map/index.html
Historic Property: Any prehistoric or historic site (including archaeological sites), district, building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).
Impacts:
Direct Impacts: Effects that are caused by the activity and occur at the same time and place (40 CFR 1508.7).
Indirect impacts: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.
Secondary impacts: Effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.

Information about secondary effects on aquatic ecosystems shall be considered prior to the time final section 404 action is taken by permitting authorities. Some examples of secondary effects on an aquatic ecosystem are: aquatic areas drained, flooded, fragmented; fluctuating water levels in an impoundment and downstream associated with the operation of a dam; septic tank leaching and surface runoff from residential or commercial developments on fill; and leachate and runoff from a sanitary landfill located in waters of the U.S. See 40 CFR 230.11(h).

Incidental Fallback: Incidental fallback is the redeposit of small volumes of dredged material that is incidental to excavation activity in waters of the U.S. when such material falls back to substantially the same place as the initial removal (33 CFR 323.2(d)(2)(iii)).

In the dry: Work that is done under dry conditions, e.g., work behind cofferdams or when the stream or tide is waterward of the work.

Independent utility: A test to determine what constitutes a single and complete non-linear project in the USACE Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Individual permit: A Department of the Army authorization that is issued following a case-by-case evaluation of a specific structure or work in accordance with the procedures of 33 CFR 322, or a specific project involving the proposed discharge(s) in accordance with the procedures of 33 CFR 323, and in accordance with the procedures of 33 CFR 325 and a determination that the proposed discharge is in the public interest pursuant to 33 CFR 320.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Intertidal: The area in between mean low water and the high tide line.

Living reef: See the definition of “artificial or living reef.”

Living shoreline: A term used to describe a low-impact approach with a substantial biological component to shoreline protection and restoration along coastal shores, riparian zones, lacustrine fringe wetlands, or oyster or mussel reef structures. This approach integrates natural features to restore, enhance, maintain, or create habitat, functions, and processes while also functioning to mitigate flooding or shoreline erosion. Living shorelines may stabilize banks and shores with small fetch and gentle slopes that are subject to low-to mid-energy waves. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes.

Loss of waters of the United States: Waters of the U.S. that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the U.S. is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for a GP; it is not a net threshold that is calculated after considering compensatory mitigation that maybe used to offset losses of aquatic functions and services. Waters of the U.S. temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the U.S. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the U.S.

Maintenance: The repair, rehabilitation, or in-kind replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 – "Activities occurring before certain dates," provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Maintenance includes minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards that are necessary to make repair, rehabilitation, or replacement are authorized. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Maintenance Exemption: In accordance with 33 CFR 323.4(a)(2), any discharge of dredged or fill material that may result from any of the following activities is not prohibited by or otherwise subject to regulation under Section 404 of the CWA: "Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design."
Mean high water: Line on the shore reached by the plane of the average high water. Where precise determination of the actual location of the line becomes necessary, it must be established by survey with reference to the available tidal datum, preferably averaged over a period of 18.6 years. Less precise methods, such as observation of the "apparent shoreline" which is determined by reference to physical markings, lines of vegetation, or changes in type of vegetation, may be used only where an estimate is needed of the line reached by the mean high water.
Mechanized land clearing: Land clearing activities using mechanized equipment such as backhoes or bulldozers with sheer blades, rakes or discs constitute point source discharges and are subject to section 404 jurisdiction when they take place in wetlands or waters of the U.S (Regulatory Guidance Letter 90-05).
Metallic mineral: Any ore or material to be excavated from the natural deposits on or in the earth for its metallic mineral content to be used for commercial or industrial purposes. "Metallic mineral" does not include thorium or uranium.
Minor deviations: Deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards, which are necessary to make repair, rehabilitation, or replacement are permitted, provided the adverse environmental effects resulting from such repair, rehabilitation, or replacement are minimal.
Natural Rocky Habitats: Intertidal and subtidal substrates of pebble-gravel, cobble, boulder, or rock ledge and outcrops. Manufactured stone (e.g., cur or engineered riprap) is not considered a natural rocky habitat. Natural rocky habitats are either found as pavement (consolidated pebble-gravel, cobble, or boulder areas) or as a mixture with fines (i.e., clay and sand) and other substrates. Rocky habitats as EFH are defined as follows: (1) All pebble-gravel, cobble, or boulder pavements; (2) Pebble-gravel mixed with fines: mixed substrate of pebble-gravel and fines where pebble-gravel is an evident component of the substrate (either through visual observation or within sediment samples). Sediment samples with a content of 10% or more of pebble-gravel in the top layer (6-12 inches) should be delineated; (3) Scattered cobble, scattered boulder, scattered cobble/boulder: mixed substate of cobble and/or boulder and other substrates. The aerial extent of cobbles and/or boulders should be delineated; and (4) All rock ledge outcrops: area should be delineated along the edge of the ledge/outcrop (as defined by NMFS Habitat and Ecosystems Services Branch, Gloucester, MA).
Navigable waters or Navigable waters of the U.S.: These waters are subject to section 10 of the Rivers and Harbors Act of 1899 and are defined as those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR Part 329). Work or structures in navigable

waters require permits pursuant to §9 and §10 of the Rivers and Harbors Act of 1899. Also see the definition of “waters of the U.S.” below.
Note: Currently the following non-tidal waters have been determined to be navigable waters of the U.S. subject to permit jurisdiction in Massachusetts: Merrimack River, Connecticut River, and Charles River to the Watertown Dam.
Nearshore disposal: This is defined in the USACE Coastal Engineering Manual as “(1) In beach terminology an indefinite zone extending seaward from the shoreline well beyond the breaker zone. (2) The zone which extends from the swash zone to the position marking the start of the offshore zone, typically at water depths of the order of 20m.” A nearshore berm is an artificial berm built in shallow water using dredged material. Often, the berm is intended to renourish the adjacent and downdrift shore over time under the influence of waves and currents.
Non-regulated activity: Only structures or fills that were previously authorized and are in compliance with the terms and condition of the original authorization can be maintained as a non-regulated activity under 33 CFR 323.4(a)(2). Minor deviations from the previously authorized footprint do not qualify as a non-regulated activity and require new authorization from the USACE. The state’s maintenance provisions may differ from the USACE and a project may require reporting and written authorization from the state.
Non-tidal wetlands: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the HTL (*i.e.,* spring HTL). Also see the definition of “Waters of the U.S.” below.
Oil or natural gas pipeline: Any pipe or pipeline for the transportation of any form of oil or natural gas, including products derived from oil or natural gas, such as gasoline, jet fuel, diesel fuel. heating oil, petrochemical feedstocks, waxes, lubricating oils, and asphalt.
Ordinary High Water Mark (OHWM): A line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas. See 33 CFR 328.3(e).
Overall project: The overall project, for purposes of these GPs, includes all regulated activities that are reasonably related and necessary to accomplish the project purpose. Also see the definition of “single and complete linear project.”
Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.
Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.
Permanent impacts: Permanent impacts means waters of the U.S. that are permanently affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent impacts include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody.
Preconstruction notification (PCN): A request submitted by the applicant to the USACE for confirmation that a particular activity is authorized by these GPs. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Preconstruction notification may be required by the terms and conditions of these GPs. A PCN may be voluntarily submitted in cases where PCN is not required and the applicant wants confirmation that the activity is authorized under these GPs.
Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions (33 CFR 332.2).
Real estate subdivision: Includes circumstances where a landowner or developer divides a tract of land into smaller parcels for the purpose of selling, conveying, transferring, leasing, or

developing said parcels. This would include the entire area of a residential, commercial or other real estate subdivision, including all parcels and parts thereof

Reconfiguration zone: A USACE authorized area in which permittees may rearrange pile-supported structures and floats without additional authorizations. A reconfiguration zone does not grant exclusive privileges to an area or an increase in structure or float area.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/ historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in again in aquatic resource area and functions (33 CFR 332.2).

Reference Site: Reference sites - Compensatory restoration, rehabilitation, and creation mitigation projects should seek to duplicate the features of reference aquatic resources or enhance connectivity with adjacent natural upland and aquatic resource landscape elements. Performance standards related to reference sites are encouraged. Mitigation project sites must be selected based on their ability to be, and continue to be, resistant to disturbance from the surrounding landscape, by locating them adjacent to refuges, buffers, green spaces, and other preserved natural elements of the landscape. In general, aquatic resource mitigation projects must be designed to be self-sustaining, natural systems within the landscape and climate in which they are located, with little or no ongoing maintenance and/or hydrologic manipulation.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area (33 CFR 332.2).

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation (33 CFR 332.2).

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Sedimentation: Sedimentation is defined as the process of deposition of a solid material from a state of suspension. Deposited sediments may accumulate and have temporal impacts to aquatic resource areas. See secondary effects definition above. For the purposes of this document, “greater than minimal sedimentation” is generally not considered to occur when using proper erosion controls (GC 25) or when sedimentation is considered “de minimis” 33 CFR 323.2(d)(5).

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term “single and complete project” is defined as that portion of the total linear project proposed or accomplished by one owner/ developer or partnership or other association of owners/developers that includes all crossings of a single water of the U.S. (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for the purposes of these GPs. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term “single and complete project” is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete

non-linear project must have independent utility (see the definition of “independent utility”). Single and complete non-linear projects may not be “piecemealed” to avoid the limits in a GP authorization.
Special aquatic sites (SAS): These include inland and saltmarsh wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230.3 and listed in 40 CFR 230 Subpart E.
Streambed: The stream substrate between the OHW marks on each side. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the streambed, but outside of the OHW marks, are not considered part of the streambed.
Stream channelization: The manipulation of a stream’s course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the U.S.
Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.
Temporal loss: The time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site(s) (33 CFR 332.2).
Temporary impacts: Temporary impacts include, but are not limited to, jurisdictional waters that are temporarily filled, flooded, excavated, or drained because of the regulated activity. Impacts are considered temporary when they are removed immediately upon completion of the activity. Note: An impact is considered temporary when the aquatic resource is restored to pre-project conditions, but effects to archaeological and/or cultural resources may be permanent in duration.
Tidal wetlands: A wetland that is subject to the ebb and flow of the tide. See the definition of “Waters of the U.S.” below.
Tide gates: Structures such as duckbills, flap gates, manual and self-regulating tide gates, etc. that regulate or prevent upstream tidal flows.
Turbidity: A measure of the level of particles such as sediment, plankton, or organic by-products, in a body of water. As the turbidity of water increases, it becomes denser and less clear due to a higher concentration of these light-blocking particles. Suspended solids are more likely to carry toxic chemicals, and can also negatively affect aquatic organisms, water temperature, and dissolved oxygen levels.
Utility line: Any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose that is not oil, natural gas, or petrochemicals. A utility line also includes any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. The term ‘utility line’ does not include activities that drain a water of the U.S., such as drainage tile or French drains, but it does apply to pipes conveying drainage from another area.
Vegetated shallows: Permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as eelgrass *(Zostera marina)* and widgeon grass (*Rupia maritima*) in marine systems (does not include salt marsh) as well as a number of freshwater species in rivers and lakes. These are a type of SAS defined at 40 CFR 230.43. Vegetated shallows are commonly referred to as submerged aquatic vegetation or SAV. Vegetated shallow survey guidance is located at www.nae.usace.army.mil/missions/regulatory /jurisdiction-and-wetlands. Maps of vegetated shallows in Massachusetts are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
Vernal pools: For the purposes of these GPs, vernal pools are depressional wetland basins that typically dry up in most years and may contain inlets or outlets, typically of intermittent flow. Vernal pools range in both size and depth depending upon landscape position and parent material(s). In

most years, vernal pools support one or more of the following obligate indicator species: wood frog, spotted salamander, blue-spotted salamander, marbled salamander, Jefferson's salamander and fairy shrimp. However, they should preclude sustainable populations of predatory fish.

Water diversions: Water diversions are activities such as bypass pumping (e.g., "dam and pump") or water withdrawals. Temporary flume pipes, culverts or cofferdams where normal flows are maintained within the stream boundary's confines aren't water diversions. "Normal flows" are defined as no change in flow from pre-project conditions.

Waters of the United States (U.S.) These waterbodies are the waters where permits are required for the discharge of dredged or fill material pursuant to §404 of the CWA. These waters include but are not limited to navigable waters of the U.S. and tidal wetlands and include many non-tidal wetlands and other waterbodies. See definitions for navigable waters of the U.S., tidal wetlands, waterbody, and non-tidal wetlands. (33 CFR 328)

Waterbody: Examples of "waterbodies" include oceans, coastal waters, rivers, streams, ditches, lakes, ponds, and wetlands. If a wetland is adjacent to a waterbody determined to be a water of the U.S., that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)).

Weir: A barrier across a river designed to alter the flow characteristics. In most cases, weirs take the form of a barrier, smaller than most conventional dams, across a river that causes water to pool behind the structure and allows water to flow over the top. Weirs are commonly used to alter the flow regime of a river, prevent flooding, measure discharge and help render a river navigable.

Wetland: Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. The Corps of Engineers Wetlands Delineation Manual in conjunction with the associated regional supplement should be used to determine if a wetland is present and delineate wetland boundaries.

Acronyms

BMPs	Best Management Practices
BUAR	Massachusetts Board of Underwater Archaeological Resources
CWA	Clean Water Act
CZM	Coastal Zone Management
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EFH	Essential Fish Habitat
FNP	Federal Navigation Project
GC	General Condition
GP	General Permit
HTL	High Tide Line
IP	Individual Permit
LID	Low impact development
MassDEP	Massachusetts Department of Environmental Protection
MA DMF	Massachusetts Division of Marine Fisheries
MHC	Massachusetts Historical Commission
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
OHW	Ordinary High Water Mark
PCN	Preconstruction Notification
SAS	Special Aquatic Sites
SF	Square Feet
SV	Self-Verification
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service
USCG	U.S. Coast Guard
USFS	U.S. Forest Service
USGS	U.S. Geological Service
WQC	Water Quality Certification

Appendix A: Guidance for NHPA Section 106 Compliance in Massachusetts

1. Purpose & Applicability

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C § 306108), requires Federal agencies to take into account the effects of their undertakings on Historic Properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Therefore, in order for an activity to be eligible for authorization under the 2023 Massachusetts General Permit, the USACE must consider the effect the activity may have on historic properties. Historic properties may include, but are not limited to, historic districts, archaeological districts, sites, buildings, structures, objects, sacred sites, traditional cultural places, and traditional cultural landscapes that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

This guidance applies to projects that require authorization under Section 404 of the Clean Water Act (33 U.S.C. § 1344) and/or Section 10 of the Rivers and Harbors Act (33 U.S.C. §403) and will assist applicants when evaluating and documenting the presence of historic properties within or near their project site(s). The prospective applicant will evaluate their proposed project using the criteria below to determine if their project has the potential to affect historic properties and if so, whether or not historic properties are present or are likely to be present. All activities authorized under these GPs shall follow the terms outlined in General Condition 14: Historic Properties and General Condition 6: Tribal Rights & Burial Sites. Prospective applicants shall complete their due diligence according to the procedures below for their application to be deemed complete.

2. No Potential to Affect Historic Properties

Certain activities do not have the potential to cause effects on historic properties, assuming such historic properties were present, based on the nature of the activity and site-specific conditions. Therefore, these activities **do not** require historic property identification efforts or notification of the SHPO, THPOs, and/or BUAR under Section 106. The USACE has determined the following activities within the stated parameters have no potential to affect historic properties:

General Permit	Activity Parameters
1	Temporary buoys, markers and similar structures that are placed during winter events on ice and removed before spring thaw.
2	Repair or rehabilitation of structures that are less than 45 years in age. Any temporary structures or fills or work necessary to complete repairs or rehabilitation must not result in any ground disturbance.
3	Maintenance and replacement of moorings that are less than 45 years in age.
6	Maintenance, repair, replacement, or removal of utility lines, oil or natural gas pipelines, outfall or intake structures, and/or appurtenant features that are less than 45 years in age when all access, staging, and ground disturbance is strictly limited to previously disturbed areas (including any previous ground disturbance). Replacement must be in kind or smaller in size. Installation of tide gates on outfall structures that are less than 45 years in age.
7	Maintenance dredging of previously dredged areas where dredging does not extend beyond the original bottom elevations.

	Disposal of dredged material at an existing established and USACE-approved confined aquatic disposal cell. Beach nourishment in ongoing existing nourishment areas.
11	Fish and wildlife harvesting and attraction devices and activities.
13	Cleanup of hazardous and toxic waste materials, including contaminated sediments, that are less than 45 years in age.
16	Removal of land-based and water-based renewable energy generation facilities and hydropower projects that are less than 45 years in age.
18	Installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures for previously authorized by the USACE and ongoing aquaculture activities. Discharges of dredged or fill material into tidal or non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities for previously authorized and ongoing aquaculture activities.
20	Maintenance activities for existing living shorelines excluding maintenance activities that require new ground disturbance such as excavation or re-sloping of the bank/shoreline.
22	Reshaping or maintenance of existing drainage ditches less than 45 years in age excluding ditch enlargement.
23	Placement of temporary and removable linear transportation and wetland/stream crossings that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
24	Placement of temporary and removable crossings and cofferdams that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
25	Emergency repair of existing structures and/or fills less than 45 years in age.

3. Historic Property Identification

If the activity does not fit under the criteria above, the following historic property identification efforts must be completed to demonstrate compliance with Section 106 of the NHPA. This includes documenting previously identified and unidentified historic properties in the project area.

a. Previously Identified Historic Properties: The prospective applicant shall document if previously identified historic properties are present on or adjacent to the project site by notifying the Massachusetts Historical Commission (MHC) and the Massachusetts Board of Underwater Archaeological Resources (BUAR), as appropriate, of the proposed project. The MHC and BUAR will check their records for the presence of any previously identified historic properties. The following outlines how prospective applicants should notify the MHC and BUAR.

i. The prospective applicant will notify the SHPO and BUAR to identify any previously recorded cultural resources. Applicants shall mail a completed Project Notification Form[18], project narrative, location (coordinates), plans, soil maps, and information on known cultural resources to the MHC. The MHC does not accept submissions via email. Applicants shall email or mail this information to the BUAR when the activity is located in lakes, ponds, rivers, and/or navigable waters in MA. Emailed file attachments should be <10MB. Any files >10MB shall be delivered via a file exchange system or the hard copy documents shall be mailed. Preferred contact information is listed below.

ii. **When sending this information, applicants must also document proof of receipt OR proof the information was delivered.** Proof of receipt constitutes a certified mail receipt, read email receipt, or other mail/email/online tracking services that document the information has reached the intended recipient(s). Proof the information was delivered constitutes a certificate of mailing, email delivery receipt, or other mail/email/online services that document the information was sent at a particular time. When using proof of delivery such (e.g., certificate of mailing), applicants should add 5 days to the 30-day notification period so the mail has time to reach its intended recipient. When using proof of receipt, the applicant may begin the 30-day notification period from the date received by the intended recipient.

iii. When mailing or emailing the application materials, applicants should include the following statement: “Please send responses to this notification directly to the USACE via email: cenae-r-ma@usace.army.mil or address regular mail responses to: Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.” Email responses to the USACE are strongly preferred. The SHPO and BUAR will contact the USACE and cc the applicant(s) within 30 days of receiving the notification if their records indicate that historic properties are located in the project vicinity, and if additional review and/or surveys are recommended to ensure NHPA compliance. If the SHPO and/or BUAR do not respond within 30 days of receiving the notification, is it presumed that no known historic properties are present.

b. Previously Unidentified Historic Properties: The prospective applicant shall evaluate the project site and determine the sensitivity for the presence of historic properties if the project site has not been previously surveyed for cultural resources within the last 10 years. If the sensitivity is determined to be moderate to high, an intensive archaeological and/or architectural survey is required to investigate the potential presence of historic properties. The individual conducting this survey must meet the Secretary of the Interior’s Standards for Professional Qualifications (48 FR 44738-44739) in the discipline relevant to a particular resource type. For example, archeologists should not document and evaluate buildings or structures and architectural historians should not document and evaluate archaeological sites. The identification and qualifications for those participating in any survey and evaluation of resources should be included with the survey results. The criteria listed below are indicators of low sensitivity for the presence of historic properties for consideration when determining if an archaeological or architectural survey is needed.

Low sensitivity indicators:

- Previous archaeological and/or architectural survey within the last 10 years with negative results.
- In a location created in modern times (i.e., built on fill placed within the last 45 years or within an area excavated within the last 45 years).
- USACE has reviewed the project description and determined that a survey is not warranted based on the proposed activity and its location.

State survey guidance and standards are provided in the September 1995 Historic Properties Survey Manual Guidelines for the Identification of Historical and Archaeological Resources in Massachusetts available. State survey guidance and standards for underwater surveys are provided

[18] https://www.sec.state.ma.us/mhc/mhcform/formidx.htm

in the Board of Underwater Archaeological Resources' 2022 Policy Guidance on Archaeological Investigations and Related Survey Standards for the Discovery of Underwater Archaeological Resources. This guidance is available on the NAE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

Please note, a negative result from MHC and/or BUAR does not necessarily mean no historic properties are present. Often proposed project sites have not been previously subject to a survey, so historic properties which may be present have not been previously recorded.

4. Tribal Coordination

Prospective applicants shall mail the Project Notification Form, project narrative, location (coordinates), plans with locus map, soil maps, and information on cultural resources to the Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag Tribe, Narragansett Indian Tribe, and/or Stockbridge-Munsee Community Band of Mohican Indians with interests in the project location. Preferred tribal contact information, including their respective areas of interest, can be found below. Applicants shall follow the same procedures as identified in Section 3(a)i-iii above when notifying Tribes of the proposed activity. Applicants shall provide the USACE with any responses received from the tribe(s) with their PCN application. If a tribe does not respond within 30 days of receiving the notification, the applicant shall provide USACE with all documentation of tribal outreach with their SV or PCN submission (e.g., emails, letters, phone call log, etc.). If the tribe indicates the presence of a previously unrecorded cultural resource, including a traditional cultural property (TCP) or traditional cultural landscape (TCL), a PCN is required.

5. Effect Determination

The project may have the potential to affect historic properties and/or tribal resources if 1) notification recipients respond within 30 calendar days of notification with concerns, 2) historic properties eligible for listing, or potentially eligible for listing in the NRHP, are present or 3) tribal resources are known to be present. The USACE may need to further review the project to confirm potential effects to historic properties and/or tribal resources. A PCN is required for any activity that may affect a historic property.

The USACE may determine the project will have 'no effect' on historic properties (i.e., no historic properties affected) when procedures outlined in Section 3 above are followed and no cultural resources are identified. Similarly, if historic properties are identified and will be completely avoided, the USACE may determine 'no effect.'

6. Contact Information:

Massachusetts Historical Commission

The Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

No email. Applicants or their representatives must send project information via certified mail and submit the certified mail receipt to the USACE or send via regular mail and submit proof of delivery.

Area of concern: All of Massachusetts.

Massachusetts Board of Underwater Archaeological Resources (BUAR)

100 Cambridge Street, Suite 900
Boston, Massachusetts 02114
Email: david.s.robinson@mass.gov

Applicants or their representatives must send project information via email (***strongly preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All waterbodies in Massachusetts.

Wampanoag Tribe of Gay Head (Aquinnah)

Bettina Washington
Tribal Historic Preservation Officer (THPO)
20 Black Brook Road
Aquinnah, Massachusetts 02535
Email: thpo@wampanoagtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Mashpee Wampanoag Tribe

ATTN: David Weeden
Tribal Historic Preservation Officer (THPO)
483 Great Neck Road South
Mashpee, Massachusetts 02649
Email: 106review@mwtribe-nsn.gov
Cc: David.weeden@mwtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Narragansett Indian Tribe

ATTN: John Brown
Tribal Historic Preservation Officer (THPO)
Narragansett Indian Longhouse
4425 South County Trail
Charlestown, Rhode Island 02813
Email: tashtesook@aol.com

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: Massachusetts east of the Connecticut River.

Stockbridge-Munsee Community Band of Mohican Indians

ATTN: Jeff Bendremer
Tribal Historic Preservation Manager
Stockbridge-Munsee Community
Tribal Historic Preservation Extension office
86 Spring Street
Williamstown, Massachusetts 01267
Email: thpo@mohican-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: West of the Connecticut River and Northfield, Montague, Miller's Falls, Turner's Falls, Sunderland, Amherst, Hadley, South Hadley, Chicopee, Springfield and Longmeadow.

APPENDIX B PRE-CONSTRUCTION NOTIFICATION

U.S. Army Corps of Engineers (USACE), New England District (NAE)

PRE-CONSTRUCTION NOTIFICATION (PCN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose The information provided will be used in evaluating activities under Pre-Construction Notification procedures within New England.

Routine Uses This information may be shared with other federal, state, and local government agencies during the application review process. Submission

Disclosure of requested information is voluntary. However, if information is not provided the PCN application cannot be fully evaluated nor can USACE render a permit decision.

Instructions The applicant must complete ALL required sections of this document before their submission to USACE. The PCN submission to USACE shall include one set of drawings which show the location and character of the proposed activity, statements that address each required field below, and documentation that supports each field (e.g., emails, letters, description/narrative, phone calls, surveys, reports, etc.). Electronic submissions to the following address are strongly preferred: cenae-r-ma@usace.army.mil. The email subject line shall contain the following: General Permit #, PCN, City/Town, and date submitted. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Middle - Last -	First - Middle - Last -
Company -	Company -
E-mail Address -	E-mail Address -
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. with AREA CODE	10. AGENT'S PHONE NOs. with AREA CODE
a. Residence b. Business c. Fax d. Mobile	a. Residence b. Business c. Fax d. Mobile

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act on my behalf as my agent in the processing of this general permit PCN application and to furnish, upon request, supplemental information in support of this general permit PCN application.

_____ _____
SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME or TITLE (*see instructions*)

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)	14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)	City: State: Zip:
Latitude: °N Longitude: °W	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID: Municipality:

Section: Township: Range:

17. DIRECTIONS TO THE SITE.

18. IDENTIFY THE SPECIFIC GENERAL PERMIT(S) YOU PROPOSE TO USE:

19. DESCRIPTION OF PROPOSED GENERAL PERMIT ACTIVITY (*see instructions*)

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)

21. PURPOSE OF GENERAL PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)

22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by Proposed General Permit Activity (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration	Purpose

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.

23. List any other GP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project on any related activity (*see instructions*)

24. If the proposed activity will result in the loss of aquatic resources that exceed those identified in the New England District Compensatory Mitigation Thresholds, explain how the compensatory mitigation requirement will be satisfied. (*see instructions*)

25. Is Any Portion of the General Permit Activity Already Complete? ☐ Yes ☐ No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. (*see instructions*)

27. List any historic properties that have the potential to be affected by the proposed GP activity or include a vicinity map indicating the location of the historic property or properties. Attach relevant project information, along with any responses received from project notifications to this submittal. (*see instructions*)

28. For a proposed GP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

29. If the proposed GP activity also requires permission from the USACE pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, have you submitted a written request for section 408 permission from the USACE district having jurisdiction over that project? ☐ Yes ☐ No

If "yes", please provide the date your request was submitted to the USACE District:

30. Does the activity require a 401 Water Quality Certification (WQC)? If so, specify the type of 401 WQC that is required (general or individual). In cases where an individual 401 WQC is required, provide the date the 401 WQC certification request was submitted to the certifying authority and their contact information.

31. If the terms of the GP(s) you want to use require additional information to be included in the PCN (i.e. sampling and analysis plan), please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

32. I certify that the information in this pre-construction notification is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The Pre-Construction Notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a

Department of the Army

General Permit (GP) Pre-Construction Notification (PCN)

Blocks 1 through 4. To be completed by the U.S. Army Corps of Engineers.

Block 5. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the PCN, please attach a sheet of paper with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the PCN. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by the applicant, if an agent is to be employed.

Block 12. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 13. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Activity Street Address. If the proposed GP activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. Location of Proposed Activity. Enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area requiring evaluation. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 15.

Block 16. Other Location Descriptions. If available, provide the Tax Parcel Identification number of the site, Section, Township, and Range of the site (if known), and / or local Municipality where the site is located.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site. You may also provide a description of the location of the proposed GP activity, such as lot numbers, tract numbers, or you may choose to locate the proposed GP activity site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed GP activity site if known. If there are multiple locations, please indicate directions to each location on a separate sheet of paper and mark as Block 17.

Block 18. Identify the Specific General Permit(s) You Propose to Use. List the number(s) of the General Permit(s) you want to use to authorize the proposed activity (e.g., GP 4).

Block 19. Description of the Proposed General Permit Activity. Describe the proposed GP activity, including the direct and indirect adverse environmental effects of the proposed activity. The description of the proposed activity should be sufficiently detailed for USACE to determine that the adverse environmental effects of the activity will be no more than minimal. Identify the materials to be used in construction, as well as the methods by which the work is to be done.

Provide drawings to show that the proposed GP activity complies with the terms of the applicable GP(s). Drawings should contain sufficient detail to provide an illustrative description of the proposed GP activity, but do not need to be detailed engineering plans. The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 19.

Block 20: Description of Proposed Mitigation Measures. Describe any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed GP activity. The description of any proposed mitigation measures should be sufficiently detailed for USACE to determine how the measures would avoid and minimize adverse environmental effects. If adverse effects exceed the New England District compensatory mitigation thresholds, you must document how compensatory mitigation would be satisfied in Block 24.

Block 21. Purpose of General Permit Activity. Describe the purpose and need for the proposed GP activity. What will it be used for and why? Also include a brief description of any related activities associated with the proposed project. Provide the approximate dates you plan to begin and complete all work.

Block 22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by the Proposed General Permit Activity. For discharges of dredged or fill material into Waters of the U.S., provide the amount of wetlands, streams, or other types of waters filled, flooded, excavated, or drained by the proposed GP activity. For structures or work in Navigable Waters of the U.S. subject to Section 10 of the Rivers and Harbors Act of 1899, provide the amount of navigable waters filled, dredged, occupied by one or more structures (e.g., aids to navigation, mooring buoys) by the proposed GP activity. The area of impact includes the structures or fills with direct or indirect effects to waters of the U.S. The length of impact includes the length of a stream, including is banks, that are directly affected by the structures or fills. The duration of impact should be identified as temporary (xx days) or permanent. The impact purpose should briefly describe what structure or fill is responsible for the impact.

Block 23. Identify Any Other General Permit(s), Regional General Permit(s), or Individual Permit(s) Used to Authorize Any Part of Proposed Activity or Any Related Activity. List any other GP(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. For linear projects, list other separate and distant crossings of waters and wetlands authorized by these GPs that do not require PCNs. If more space is needed, attach an extra sheet of paper marked Block 23.

Block 24. Compensatory Mitigation Statement for Losses Greater Than the New England District Compensatory Mitigation Thresholds. New England District requires compensatory mitigation at a minimum one for one replacement ratio or greater for all aquatic resource losses that require a PCN and exceed the New England District Compensatory Mitigation Thresholds, unless USACE determines in writing that either some other form of mitigation is more environmentally appropriate or the adverse environmental effects of the proposed GP activity are no more than minimal without compensatory mitigation, and provides an activity specific waiver of this requirement. Describe the proposed compensatory mitigation for wetland losses greater than the New England District Compensatory Mitigation Thresholds or provide an explanation of why USACE should not require wetland compensatory mitigation for the proposed GP activity. If more space is needed, attach an extra sheet of paper marked Block 24.

Block 25. Is Any Portion of the General Permit Activity Already Complete? Describe any work that has already been completed for the GP activity.

Block 26. List the Name(s) of Any Species Listed As Endangered or Threatened under the Endangered Species Act that Might be Affected by the General Permit Activity. If you are not a federal agency, and if any listed species or designated critical habitat might be affected or is in the vicinity of the proposed GP activity, or if the proposed GP activity is located in designated critical habitat, list the name(s) of those endangered or threatened species that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 7 of the Endangered Species Act.

Block 27. List Any Historic Properties that Have the Potential to be Affected by the General Permit Activity. If you are not a federal agency, and if any historic properties have the potential to be affected by the proposed GP activity, list the name(s) of those historic properties that have the potential to be affected by the proposed GP activity. Provide all relevant documentation about these historic properties in the PCN submittal. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

Block 28. List the Wild and Scenic River or Congressionally Designated Study River if the General Permit Activity Would Occur in such a River. If the proposed GP activity will occur in a river in the National Wild and Scenic River System or in a river officially designated by Congress as a “study river” under the Wild and Scenic Rivers Act, provide the name of the river. For a list of Wild and Scenic Rivers and study rivers, please visit http://www.rivers.gov/

Block 29. General Permit Activities that also Require Permission from the USACE Under 33 U.S.C. 408. If the proposed GP activity also requires permission from the USACE under 33 U.S.C. 408 because it will temporarily or permanently alter, occupy, or use a USACE federal authorized civil works project, indicate whether you have submitted a written request for section 408 permission from the USACE district having jurisdiction over that project.

Block 30. 401 Water Quality Certification. As described above, specify if the activity requires a 401 WQC from the certifying authority.

Block 31. Other Information Required For General Permit Pre Construction Notifications. The terms of some of the General Permits include additional information requirements for preconstruction notifications:

* Maintenance – information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals.
* Temporary Construction, Access, and Dewatering – a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions.
* Repair of Uplands Damaged by Discrete Events – documentation, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration.
* Commercial Shellfish Aquaculture Activities – (1) a map showing the boundaries of the project area, with latitude and longitude coordinates for each corner of the project area; (2) the name(s) of the species that will be cultivated during the period this GP is in effect; (3) whether canopy predator nets will be used; (4) whether suspended cultivation techniques will be used; and (5) general water depths in the project area (a detailed survey is not required).Dredging – (1) a proposed sampling and analysis plan shall be provided to USACE for approval prior to its execution. Pre-application meetings are encouraged.
* Beach Nourishment – sediment grain size should be determined for the length of the beach where nourishment is proposed. The frequency and locations of sediment sampling shall be sufficient to identify the sediment composition of the beach profile. This data shall be consolidated to generate a sediment gradation curve for each sampled transect. Each sampled transect should also be identified on the project plans (drawings).

If more space is needed, attach an extra sheet of paper marked Box 31.

Block 32. Signature of Applicant or Agent. The PCN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the PCN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the PCN possesses the requisite property rights to undertake the GP activity (including compliance with special conditions, mitigation, etc.).

DELINEATION OF WETLANDS, OTHER SPECIAL AQUATIC SITES, AND OTHER WATERS

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by the USACE. The permittee may ask the USACE to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the USACE does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. The 60-day PCN review period will not start until a delineation has been completed.

DRAWINGS AND ILLUSTRATIONS

General Information.

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a Vicinity Map, a Plan View or a Typical Cross Section Map. Identify each illustration with a figure or attachment number. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings should also be included. Please submit one copy of all drawings on 8½ x 11 inch plain white paper (electronic submissions preferred). Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate, and contain all necessary information.

ADDITIONAL INFORMATION AND REQUIREMENTS

For proposed GP activities that involve discharges into waters of the United States, water quality certification from the State, Tribe, or EPA must be obtained or waived. Some States, Tribes, or EPA have issued water quality certification for one or more GPs. Please check the New England District website to see if water quality certification has already been issued for the GP(s) you wish to use. For proposed GP activities in coastal states, state Coastal Zone Management Act consistency concurrence must be obtained, or a presumption of concurrence must occur. Some States have issued Coastal Zone Management Act consistency concurrences for one or more GPs. Please check the New England District website to see if Coastal Zone Management Act consistency concurrence has already been issued for the GP(s) you wish to use.

APPENDIX C SELF-VERIFICATION NOTIFICATION

U.S. Army Corps of Engineers (USACE)

SELF-VERIFICATION NOTIFICATION (SVN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose This information will be used in evaluating activities under Self-Verification procedures within Massachusetts.

Routine Uses Routine uses will include: (1) Documenting compliance with the terms and conditions of the General Permit (GP) for activities that may require authorization pursuant to one or more of USACE's Regulatory authorities. (2) Records may be referred to other Federal, State, and local agencies for evaluation and enforcement purposes.

Disclosure Failure to fully comply and abide by the GP terms and conditions prior to commencing work and after completion project may result in formal enforcement action, up to and including monetary penalties and/or legal action, pursuant to 33 CFR Part 326.

Instructions The permittee must complete ALL required sections of this document before commencing USACE-regulated activities. A copy of this completed SVN must be kept on site during construction and be made available for review by USACE and other Federal, State, & Local regulatory authorities at any time. Within 30 days of initiating project construction, the permittee shall submit the completed SVN to USACE. The SVN shall be submitted to USACE as **ONE signed document** that includes project plans and documentation that supports each field (e.g., emails, letters, description, phone calls, surveys). Electronic submissions to the following address are strongly preferred: cenae-r-ma-sv@usace.army.mil. The email subject line shall contain the following: GP #, SVN, City/Town, and date submitted.

(ITEMS 1 THRU 3 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED

APPLICANT AND AGENT INFORMATION

4. APPLICANT'S NAME	7. AGENT'S ADDRESS:
First - Middle - Last -	First - Middle - Last -
Company -	Company -
E-mail Address -	E-mail Address -
5. APPLICANT'S ADDRESS:	8. AGENT'S ADDRESS:
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
6. APPLICANT'S PHONE NOs. w/AREA CODE	9. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax

NAME, LOCATION, AND DESCRIPTION OF PROJECT SITE

10. PROJECT NAME OR TITLE

11. FILE NUMBER(S) OF PREVIOUS USACE ACTIONS ON THE SITE (if applicable)	12. NAME OF WATERBODY
13. PROJECT COORDINATES (in decimal degrees)	14. PROJECT STREET ADDRESS (if applicable)
Latitude: ◦N Longitude: ◦W	Address
	City - State - Zip -

ACTIVITY TYPE, PROJECT IMPACTS, AVOIDANCE & MINIMIZATION

15. GENERAL PERMIT ACTIVITIES (CHECK ALL THAT APPLY)

1 ☐	6 ☐	11 ☐	16 ☐	21 ☐
2 ☐	7 ☐	12 ☐	17 ☐	22 ☐
3 ☐	8 ☐	13 ☐	18 ☐	23 ☐
4 ☐	9 ☐	14 ☐	19 ☐	24 ☐
5 ☐	10 ☐	15 ☐	20 ☐	25 ☐

16. SUMMARY OF PROJECT IMPACTS (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration

17. PROJECT PLANS (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE ITEMS ARE COMPLETE) (*see instructions*)

- ☐ a. Plans shall at least contain the following: Vicinity Map, Plan View, and Typical Cross Section View of the proposed activity.
- ☐ b. All direct, indirect and secondary impacts from USACE regulated activities are shown on the project plans.
- ☐ c. The size of the impact area for each activity (acre, square feet, linear feet) are shown on the project plans.
- ☐ d. For discharges of fill material (§404), the volume of fill material is identified on the project plans.
- ☐ e. The duration of each impact, permanent or temporary (X days), is identified on the project plans.
- ☐ f. Do activities with permanent impacts result in the loss of waters? If so, this is identified on the project plans.
- ☐ g. All aquatic resources in the vicinity of the USACE regulated activities are delineated on the project plans.

18. AVOIDANCE & MINIMIZATION (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE CRITERIA ARE MET) (*see instructions*)

- ☐ a. The project has been designed to avoid and minimize impacts to aquatic resources.
- ☐ b. The footprint of activities in waters of the U.S. has been reduced to only what is necessary to achieve the overall project purpose.
- ☐ c. All practicable measures have been taken to avoid and minimize impacts to aquatic resources through construction techniques and site access (e.g., Best Management Practices, Time of Year Restrictions).
- ☐ d. All temporary impacts from USACE regulated activities will be restored upon completion of construction and the project area will be returned to pre-construction contours and conditions.

COMPLIANCE WITH FEDERAL REGULATIONS & SUPPLEMENTAL INFORMATION

19. DUE DILIGENCE (*see instructions*)

Complete the entries below to document compliance with the following Federal requirements. Construction may NOT begin if a PCN is/may be required, and you must contact USACE to determine permitting requirements. Documentation that demonstrates how the activity complies with each field below shall be submitted to the USACE as noted in the instructions block. See each General Condition (GC) in the GP for how to comply with each requirement.

a. State Historic Preservation Officer	Select Option
b. Massachusetts BUAR	Select Option
c. Tribal Historic Preservation Officers	Select Option
d. Endangered Species Act - NOAA	Select Option
e. Endangered Species Act - USFWS	Select Option
f. Northern Long Eared Bat (ESA)	Select Option
g. Essential Fish Habitat	Select Option
h. Wild & Scenic Rivers	Select Option
i. 401 Water Quality Certification 401	Select Option
	401 WQC/OOC File Number: OOC issued: 401 issued:
j. Section 408 Permission	Select Option
k. Coastal Zone	Select Option
l. Construction Mats	Select Option
m.Time of Year Restrictions	Select Option
n. Vernal Pools	Select Option
o. Sediment & Erosion Controls	Select Option
p. Stream/Wetland Crossings	Select Option

20. AQUACULTURE ACTIVITIES - GP 18 (*see instructions*)

- ☐ a. If required, an Aquaculture Certification from the Massachusetts Division of Marine Fisheries was obtained prior to commencing work.
- ☐ b. Coordination with the U.S. Coast Guard pursuant to Private Aids to Navigation has occurred prior to commencing work.
- ☐ c. If required, a MEPA Certificate was obtained from the Massachusetts Environmental Protection Agency prior to commencing work. Select Option
- ☐ d. The prospective permittee contacted local authorities (e.g. harbormaster, select board, shellfish constable) for authorization of their facility prior to commencing work.

21. ADDITIONAL INFORMATION/ATTACHMENTS (*see instructions*)

- ☐ a. The project plans are enclosed in this SVN submittal (see block 17).
- ☐ b. The activity Select Option funded through the Bipartisan Infrastructure Bill (also known as the Infrastructure Investment and Jobs Act).
- ☐ c. All required state, local and federal approvals were acquired prior to starting construction in USACE jurisdiction.
- ☐ d. After construction of the activity is completed, a complete Certificate of Compliance will be submitted to USACE.

22. IS THERE ANOTHER LEAD FEDERAL AGENCY:

☐ YES ☐ NO

23. STATEMENT OF AUTHORIZATION *(see instructions)*

I certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

24. SIGNATURES *(see instructions)*

I hereby certify that the information in this Self-Verification Notification is complete and accurate. As the applicant or their duly authorized agent, I certify the activity was completed in accordance with the terms and conditions of the GP. This includes all applicable terms, general conditions, and activity-specific GP criteria. I agree to allow the duly authorized representatives of the Corps of Engineers Regulatory Program and other regulatory or advisory agencies to enter upon the premises of the project site at reasonable times to evaluate inspect and photograph site conditions. This consent to enter the property is superior to, takes precedence over, and waives any communication to the contrary. For example, if the property is posted as “no trespassing” this consent specifically supersedes and waives that prohibition and grants permission to enter the property despite such posting.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army
General Permit (GP) Self-Verification

Blocks 1 through 3. To be completed by the Corps of Engineers.

Block 4. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the self-verification, please attach a sheet of paper with the necessary information marked Block 4.

Block 5. Address of Applicant. Please provide the full address of the party or parties responsible for the self-verification. If more space is needed, attach an extra sheet of paper marked Block 5.

Block 6. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 7 through 9. To be completed, if you choose to have an agent.

Block 7. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 8 and 9. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 10. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 11. File Number(s) of Previous USACE Actions on the Site Please provide any known USACE file number. If the activity does not have a known USACE file number, you may state N/A.

Block 12. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 13. Proposed Activity Coordinates. Please enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 13.

Block 14. Proposed Activity Street Address. If the proposed activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. General Permit Activity Type. Please select all GP activity types that apply to the proposed activity. A list of GP activity types can be found in Section III of the GP.

Block 16. Summary of Project Impacts. Please provide ALL proposed impacts, both temporary and permanent in duration, that are located in Waters of the United States. The area of impact shall be provided in square feet (SF). When applicable, impacts that result in conversion of stream bank or shoreline must also be identified in linear feet (LF). Dredging or the discharge of dredged or fill material shall also include the volume, cubic yards (CY), of material removed from or placed into Waters of the U.S. If more entries are required, please attach a table matching the desired format in Block 16.

Block 17. Project Plans. Please verify that items a-g are included in the project plans. Three types of illustrations are necessary to properly depict the proposed work. These illustrations or drawings are identified as a Vicinity Map, a Plan View (Aerial view) and a Cross Section Map. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings (longitudinal profile) should also be included. Plans must accurately depict the existing conditions and all aspects of the proposed activity located in waters of the U.S. Please submit one copy of all drawings formatted to print on 8½ x 11 inch or 11 x 17 inch plain white paper. Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be certified engineering sheets; they should be clear, accurate, contain all necessary information, and depict all proposed work. Each submission must also include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by USACE.

Block 18. Avoidance & Minimization. Please verify that items a-d have been implemented for the proposed activity.

Block 19. Due Diligence. Please complete all the fields and submit documentation to USACE to demonstrate compliance with the above requirements. This Documentation may include emails, letters, meeting notes, phone call log, project narrative, project plans, a species list from the NOAA Section 7 Mapper, a completed copy of the IPAC determination keys, etc. Documentation should be limited to what is necessary to demonstrate how the proposed activity meets each requirement. Refer to the MA GP, Appendix A, for specific guidance on the identification of previously identified historic properties and previously unidentified historic properties. Endangered Species: *The applicant must be designated as the non-federal representative for the purposes of Section 7 consultation to select the Rangewide D-Key options. Otherwise, the applicant shall select the following option when IPAC indicates the NLEB is present: "The activity IS located within the NLEB Species Range (PCN Required)."

Block 20. Aquaculture Activities. Please verify that items a-d have been obtained or completed prior to commencing work in waters of the U.S.

Block 21. Additional Information/Attachments. Please verify that items a-d have been completed prior to commencing work in waters of the U.S.

Block 22. Lead Federal Agency. Please identify if there is another lead federal agency involved with the proposed activity. Enter the lead federal agency name (e.g., the Federal Emergency Management Agency, FEMA) and the agency's designated person of contact for the activity.

Block 23. Statement of Authorization. The applicant shall sign this section for all activities. If an agent is to be employed, the agent shall sign this section.

Block 24. Signatures. The SVN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the SVN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the SVN possesses the requisite property rights to undertake the GP activity.

US Army Corps of Engineers®
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APPENDIX D: PCN APPLICATION CHECKLIST

The following information shall be submitted for all PCNs for USACE to properly evaluate your application. Some applications may require more information and this checklist is offered as a tool to assist applicants with submitting a complete application.

SECTION 1: GENERAL APPLICATION INFORMATION

1. ☐ Complete the Pre-Construction Notification document (Appendix B).
2. ☐ Specify which local/state/federal authorizations are required for the project and if any have been obtained or applied for at the time of USACE application submittal.
3. ☐ Identify all funding sources the project will receive or has received to date. Provide any relevant information in the application submission.
4. ☐ Is this part of a larger project that is being implemented in phases? If so, describe the project schedule and how each phase will be implemented.
5. ☐ Describe the existing conditions on the site and the general land use in the vicinity of the project at the time application submittal.
6. ☐ Provide any historic information available that you may have of project area, e.g., existing USACE permit numbers, the names under which the permits were obtained if the permit numbers are unknown, construction dates and proof of prior existence (aerials, photos, town hall records, affidavits, state or local permits, etc.) to verify that the project predates regulation and is "vested".[19]
7. ☐ The anticipated start and end dates for construction.

SECTION 2: WETLAND DELINEATION

8. ☐ Data used to support aquatic resource boundary determinations (delineation forms, delineation map(s) that show the locations of each aquatic resource in the project area, aerial and ground photographs, LIDAR imagery, national wetland inventory maps, soil maps, national hydrography dataset maps, floodplain maps, historical imagery, etc.).
9. ☐ Photographs of the wetland(s) and/or waterway(s) where impacts are proposed. Photos at low tide are preferred for work in tidal waters.
10. ☐ Indicate the relationship of the project area to waters of the U.S., i.e., adjacent wetlands, tidal influence or hydraulic connectivity through culverts, or other conveyances, etc.
11. ☐ At minimum the delineation map/figure should include the following:
    a. Contour lines showing topography.
    b. North arrow.
    c. Bar and text scale.
    d. Legend.
    e. Drawn project boundary.
    f. High tide line, mean high water, mean low water, ordinary high water mark, and/or wetland boundaries.
    g. Captions with a unique name for each aquatic resource and the area or length of the aquatic resource within the project area.

[19] Vested is exempt (someone or something) from a new law or regulation.

h. Appropriate landmarks and features (e.g., culverts, special aquatic sites, etc.).
i. Points showing the paired upland and wetland delineation locations for tidal and non-tidal wetlands only.

SECTION 3: AVOIDANCE & MINIMIZATION

12. ☐ Describe specific measures taken to avoid impacts to aquatic resources or describe why aquatic resources could not be avoided while achieving the project purpose and need.
13. ☐ For impacts to aquatic resources that could not be avoided, describe specific considerations/ measures taken to minimize the area of proposed impacts to aquatic resources in designing the project.
14. ☐ Describe specific measures taken to avoid and minimize the proposed direct, indirect, and secondary impacts to aquatic resources and their functions through construction techniques and timing.
15. ☐ If applicable, provide a restoration plan that describes how all temporary fills and structures will be removed and the area restored to pre-impact conditions (see GC 22).
16. ☐ If applicable, provide an Invasive Species Control Plan (see GC 29). For sample control plans, see www.nae.usace.army.mil/missions/regulatory/invasive-species.
17. ☐ If applicable, describe how the proposed wetland/waterbody crossing is compliant with GC 31, Stream Work and Crossings, and Wetland Crossings.

SECTION 4A: PROJECT IMPACTS

18. ☐ Describe the overall project and the activities located in Waters of the U.S. (WOTUS) that you are seeking authorization for.
19. ☐ Identify the following for project impacts in WOTUS:
    a. ☐ Direct, indirect, secondary impacts[20] within WOTUS.
    b. ☐ The size of each impact (square feet or acres, or linear feet).
    c. ☐ For discharges of fill material (§404), specify the volume of fill material to be discharged (cubic yards).
    d. ☐ The impact duration from each activity, permanent or temporary (X days).

SECTION 4B: PROJECT PLANS

20. ☐ Submit project plans that depict all impacts in WOTUS. On the project plans, applicants shall provide:

General Information

    a. ☐ Plan view and typical cross-section view sheets that show the existing and proposed conditions. These illustrations should each be identified with a figure number, date of the map, the project title, the name of the applicant and the type of illustration (vicinity map, plan view, or cross section).
    b. ☐ Drawings, sketches, or plans that are legible, reproducible (color is encouraged, but features must be distinguishable in black and white), drawn to scale, and no larger than 11”x17” and 10 MB when submitted in digital format. Numeric and graphic/bar scales must agree, and plan details must be measurable using a standard engineer’s scale on printed plans. Reduced plans are not acceptable.
    c. ☐ The north arrow and remove miscellaneous non-wetland or water project related features such as conduits, utility poles, guardrails, etc.

[20] See definitions section for the definitions of direct, indirect, secondary impacts.

d. ☐ Clearly draw the overall limits of work, staging areas, disposal sites, access routes, and any permittee responsible mitigation sites. These areas may include both aquatic resources and upland areas.
e. ☐ Names or numbers of all roads in the site's vicinity and ownership and numbers of abutting parcels.
f. ☐ Datum in plan and elevation views. The horizontal datum shall be in the NAD 83 Massachusetts State Plane Coordinate System (INSERT) in U.S. survey feet. The vertical data in coastal projects shall be referenced to either MLLW or the North American Vertical Datum of 1988 (NAVD 88). Both the distance and depth units shall be U.S. survey feet and specified on the project plans.

Aquatic Resources & Project Impacts

g. ☐ Delineation of all aquatic resource types on site including salt marsh; other special aquatic sites (vegetated shallows, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges); other waters, such as lakes, ponds, vernal pools, natural rocky habitat (tidal only), and perennial, intermittent, and ephemeral streams.
h. ☐ Identify the substrate type (cobble/gravel, organic detritus, sand/shell, silt, mud) and the approximate percentage of each substrate type on site. Grain sizes shall be based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders. Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.
i. ☐ The direction of ebb and flood in tidal waters and direction of flow in non-tidal waters.
j. ☐ In tidal waters, the project boundary distance from special aquatic sites identified in 20g above if within 25 feet from that resource.
k. ☐ USACE jurisdictional boundaries including ordinary high-water mark (OHWM), high tide line (HTL), mean high water (MHW). Other boundaries include mean low water (MLW), mean lower low water (MLLW), as applicable.
   - Non-tidal: OHWM and/or wetland boundaries.
   - Tidal (structures/work only): MHW, MLW.
   - Tidal (Fill and Structures/work): HTL, MHW, MLW.
   - Tidal (Dredging/Beach Nourishment): HTL, MHW, MLW, MLLW.
l. ☐ Identification of each aquatic resource with a unique name (ex. Wetland 1, Wetland 2, Tributary 1, Beaver Brook, Atlantic Ocean) and the size of each aquatic resource within the project area (square feet or acres).
m. ☐ Impacts to each aquatic resource with captions denoting the size of each impact (square feet, acres, or linear feet) and the duration of the impact (ex. Permanent, Temporary (X days).

SECTION 4C: PROJECT PLANS - SPECIFIC PROJECT INFORMATION

21. ☐ For projects involving Navigation, Structures, Dredging, and/or Beach Nourishment, the applicant shall also address the following:

Navigation

a. ☐ Identify the locations of adjacent Federal navigation project (FNP) and/or state/local navigation projects on the project plans.
b. ☐ Specify the distance between the FNP and proposed project boundary, the authorized depths of the FNP, and state plane coordinates of seaward end(s) of project structures near an FNP.

Structures

a. ☐ Identification of the piling type (steel, timber, concrete) and diameter to be removed and/or installed.
b. ☐ Specify the minimal height of the structures' frame over saltmarsh. To meet the SV threshold, piers must be ≤4 feet in width and this minimal height must achieve a 1.5:1 ratio (i.e., a 4-foot-wide pier is 6 feet above a saltmarsh).
c. ☐ For floats, the methods of securing them (piles, bottom anchors) and for keeping them off substrate (skids, stops) at low water. To meet the SV threshold, a minimum depth of 18-inches of water should be maintained below a floating dock/structure at lower tide levels.

Dredging

a. ☐ The area (SF, acre) and volume (CY) of material to be dredged waterward of MHW for each dredge location.
b. ☐ Dredge boundaries.
c. ☐ Bathymetry for existing, proposed, and historical (include dates and USACE permits) dredge depths.
d. ☐ The likely final angle of repose of the side cuts based on the physical characterization of the material to be dredged and based upon the high/ medium/low, wave or current energy of the location.
e. ☐ Label area whether the dredging is new, maintenance, improvement, or a combination.
f. ☐ Location of the disposal site (include location sheet). NOTE: For projects proposing open water, nearshore disposal, or beach nourishment, contact USACE as early as possible for sampling and testing protocols. Sediment testing, including physical (e.g., grain-size analysis), chemical and biological testing may be required. Sampling/testing of sediments without such contact should not occur and if done, will be at the applicant's risk.
g. ☐ The methods and areas used to retain or prevent dredged material from running back into the wetland or waterway. Provide the capacity of the storage area and points of runback, including the overflow route, into the aquatic system.
h. ☐ For open-water disposal, explain why inland or beneficial reuse sites are not practicable.
i. ☐ Show the finished top elevation of the disposal site.

Beach Nourishment

a. ☐ For beach nourishment, identify the disposal footprint, existing and proposed nourishment profiles (multiple profiles are appropriate if the site is more than 150 feet long or non-contiguous), total fill area (SF) and volume (CY), fill area and volume waterward of the HTL, and delineation of dunes, banks, existing beach vegetation, and contours.
b. ☐ For beach nourishment identify the substrate type (fine sand, sand, cobble, boulder) and/or grain-size of existing material.

SECTION 5: STRUCTURES

22. ☐ For projects with the removal of existing pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be removed and the methodology for removal (cut off at mud line, pulling, vibratory, etc.).
23. ☐ For projects with the installation of new pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be installed and the methodology for installation (vibratory hammer, impact hammer etc.).
24. ☐ Identify any existing structures and moorings in waters adjacent to the proposed activity, their dimensions, and the distance to the limits and coordinates of any proposed mooring field or reconfiguration zone. For reconfiguration zone and mooring fields, provide the coordinates for all

corners based on the Massachusetts State Plane Coordinate System. Specify the maximum number of slips and/or moorings within proposed reconfiguration zones or anchorage areas.

25. ☐ The dimensions of the structure or work and extent of encroachment waterward of MHW and from affixed point on the shoreline or upland.
26. ☐ Shoreline of adjacent properties and property boundary offset for structures. In narrow waterbodies, the distance to opposite shoreline, waterway width, and structures across from proposed work.
27. ☐ For new commercial boating facilities, anchorage areas or reconfiguration zones, provide a description of the type of vessels that would use the facility, and any plans for sewage pump-out facilities, fueling facilities and contingency plans for oil spills.
28. ☐ See Sections 4A-C above.

SECTION 6: AQUACULTURE

29. ☐ Identify the coordinates for lease area corners and gear configuration area on the project plans.
30. ☐ Identify the proposed aquaculture gear type (buoys, floats, racks, trays, nets, lines, tubes, cages, containers, and other structures). Provide the impacts for each aquaculture gear type (see Section 4A 19a-d).
31. ☐ For a GP 18 to be valid, applicants must have (a) their MA DMF Aquaculture Certification letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.
32. Provide information on site the operation, maintenance, and access. Will the site be accessed via boat, kayak, etc.? Will cages be removed in the winter? How often will gear be checked on? Is there an operations plan for the proposed aquaculture area?
33. ☐ See Sections 4A-C above.

SECTION 7: DREDGING

34. ☐ Sampling plan requests for new, improvement or maintenance dredging must submit completed **Dredged Material Evaluation checklist found at Dredged Material Evaluation Checklist, Sampling and Analysis Plan Requirements from Applicant (army.mil)** and identify the method of handling/transporting the dredged material.
35. ☐ Identify grain-size of material to be dredged (e.g., silty sand) and provide any existing sediment grain size and bulk sediment chemistry data from the proposed project or nearby projects. Include information on any recent spills of oil and/or other hazardous materials and/or nearby outfalls. Document the information source, e.g., EPA database, the harbormaster or fire chief. If there are none, state “none”.
36. ☐ See Section 4A, 4B and 4C, Dredging 21(a-i) above.

SECTION 8: WETLAND/WATERBODY CROSSINGS

37. ☐ For the stream crossing, identify the crossing methodology on the project plan (e.g., dam and pump, dry, wet, etc.). Submit a waterway crossing sequencing plan with the application.
38. ☐ If the project includes a permanent crossing of a tidal waterway, your project design should be modified to match the velocity, depth, cross-sectional area, and substrate of the existing waterbody adjacent to the crossing and provide documentation (hydraulic analysis including low lying property analysis) that the size of the crossing will not restrict tidal flow over the full natural tide range and will not adversely affect abutting infrastructure.

39. ☐ If the work includes a permanent crossing of a non-tidal stream, your project design should be modified to match the culvert gradient of the existing stream channel profile, provide clearance for ≥1.2 times bank full width and conveyance should be embedded ≥1-2 feet for box culverts and pipe arches or ≥1-2 feet and at least 25 percent for rounded pipes/culverts in accordance with the Massachusetts Stream Crossing Standards. Provide the basis for any variation to this requirement.
40. ☐ If the work includes a permanent crossing of a non-tidal stream, the structure should be designed to include a natural bottom substrate within the conveyance that matches the characteristics of the substrate in the natural stream channel and the character of the banks (mobility, slope, stability, confinement, grain and rock size). The conveyance should be designed with a minimum openness ratio ≥0.82-feet (0.25-meters). For how to calculate openness ratio and stream simulation ecological approach for road and stream crossings, see https://www.nae.usace.army.mil/Missions/Regulatory/Stream-and-River-Continuity/.

SECTION 9: COMPENSATORY MITIGATION

41. ☐ Does the project require Compensatory Mitigation[21] for impacts to Waters of the U.S.? (See Section V in the 2023 Massachusetts General Permit)
42. ☐ If the project requires mitigation, does the selected compensatory mitigation option (i.e., In-Lieu Fee, permittee-responsible mitigation) deviate from the order of the options presented in §332.3(b)(2)-(6)? If so, please explain why. https://www.ecfr.gov/current/title-33/chapter-II/part-332/section-332.3
43. ☐ For any compensatory mitigation that involves preservation, the applicant must use a site protection instrument to preserve the parcel in perpetuity. (Conservation Easement, Deed Restriction, etc.) https://www.mass.gov/service-details/conservation-restriction-review-program.

SECTION 10: HISTORIC PROPERTIES & NOTIFICATIONS TO SHPO, THPOs, BUAR

44. ☐ Notify the SHPO, Massachusetts Historical Commission, of the Project via Certified Mail and include proof of delivery or receipt in the application package (See Appendix A).
45. ☐ As applicable, notify the THPOs, Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and Mashpee Wampanoag Tribe, of the Project via email OR mail and include proof of delivery or receipt in the application package (See Appendix A).
46. ☐ As applicable, notify the BUAR via email (*strongly preferred*) OR mail and include proof of delivery or receipt in the application package (See Appendix A).
47. ☐ Include responses to this notification in the permit application.
48. ☐ As applicable, information on historic properties (Tribal and Archaeological) within the project area should be provided in the permit application.

SECTION 11: ENDANGERED SPECIES & ESSENTIAL FISH HABITAT

49. ☐ Provide a USFWS Information for Planning and Consultation (IPaC) Official Species List from https://ecos.fws.gov/ipac and the email of the individual who generated the list (see GC 10 of the 2023 Massachusetts General Permit for more information).
50. ☐ Provide a species list from the NMFS Section 7 Endangered Species Act mapper at https://noaa.maps.arcgis.com/apps/webappviewer/index.html.
51. ☐ Provide a species list from the NMFS Essential Fish Habitat Mapper at https://www.habitat.noaa.gov/apps/efhmapper/?page=page_3.

[21] Your mitigation proposal must be consistent with the December 29, 2020 Compensatory Mitigation Standard Operating Procedures at https://www.nae.usace.army.mil/Portals/74/docs/regulatory/Mitigation/Compensatory-Mitigation-SOP-2020.pdf and 2008 Mitigation Rule.

52. ☐ If the project will generate turbidity, describe the extent of turbidity and if erosion controls will be used to contain turbidity. If turbidity controls are not operationally feasible, explain the basis for your conclusion and identify any other measures that you will implement to minimize resuspension of sediment.
53. ☐ Identify the substrate type and any aquatic resources that will be affected by the proposed action. (SAV, salt marsh, sand, silt/clay, rocky/hard bottom)
54. ☐ For projects which will include the installation of pilings/sheet-piles, identify the substrate at the project site (sand, cobble, silt/mud/clay), the installation method (vibratory hammer, impact hammer, combination) and indicate whether the following “soft start” procedures at beginning of the workday and after a 30-minute period of rest will be deployed:
    a. ☐ Vibratory Pile Installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.
    b. ☐ Impact Pile Installation: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving.
55. ☐ If the project involves dredging, describe any dredge history, number of dredge events to be covered by the permit, erosion/sediment controls, dredge type, intake structures (mesh screen size), dredged material disposal site.
56. ☐ For project activities associated with structures, identify the number, type (drill barge, work boat, tugboat, etc.), and size of any temporary vessels that will be used. Specify measures that will be implemented to ensure vessels are not berthed in shallow water or will “ground out” at low tide.
57. ☐ For aquaculture projects identify whether any component of the gear is seasonal (will be removed annually) or will be in place year-round. If gear will be present year-round and will be variably managed (e.g., floating in summer, bottom in winter) identify month/date for such configurations.
58. ☐ For aquaculture projects identify whether the project will involve use of an existing vessel or new vessel. Identify the length for all work vessels and identify the distance round trip from vessel berthing location and aquaculture area.
59. ☐ For project activities associated with docking structures (either commercial, industrial, or recreational) identify the number, type (motorized/non-motorized, jet-ski, sailboat, kayak, canoe, other that will be berthed there and the sizes of each.
60. ☐ Information required for Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act:
    a. Results of an eelgrass survey completed per the INSERT.
    b. Essential Fish Habitat Assessment to determine project-related impacts to essential fish habitat, using guidance developed by the National Marine Fisheries Service.
61. ☐ A document containing the following information (requirements of 50 CFR §600.920(e)(3)):
    a. Description of proposed action.
    b. Analysis of potential adverse effects on essential fish habitat.
    c. Conclusions regarding the effects of the action on essential fish habitat.
    d. If applicable, proposed mitigation.
    e. Analysis of alternatives to the proposed action.
    f. Other:

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PROVINCETOWN -
SHANK PAINTER ROAD AND ROUTE 6 IMPROVEMENTS

GEOTECHNICAL REPORT

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APEX COMPANIES, LLC

MassDOT Project #608744
Provincetown – Shank Painter Road and Route 6 Improvements

Fed Aid No. STP/CMQ/TAP-0035(070)X

Geotechnical Report – PSE – V1
Date: April 24, 2026

PREPARED FOR:
Massachusetts Department of Transportation Highway Division
10 Park Plaza
Boston, MA 02116

Technical Memorandum

Date: April 22, 2026

To: Town of Provincetown

From: Dan Sheftick, P.E., Senior Geotechnical Engineer, Apex Companies, LLC
Ziad F. Kary, P.E., Senior Principal, Apex Companies, LLC

CC: Ryan Paul, Apex Companies, LLC

Subject Geotechnical Investigation and Construction Recommendations
Court Street Pump Station and Mass Route 6/Shank Painter Road Retaining Walls – Provincetown, Massachusetts

This memorandum presents the geotechnical investigation and construction recommendations for the addition of a stormwater pump station with wet wells along Court Street, the construction of one retaining wall along Massachusetts (Mass) Route 6 and two retaining walls along Shank Painter Road in Provincetown, Massachusetts. The memorandum includes geotechnical investigation, foundation design recommendations, guidance for dewatering and construction recommendations, boring logs, and laboratory analysis results.

Background

Site Location and Description

The proposed Court Street stormwater pump station is located to the northeast of Winthrop Street and to the south of Court Street at the intersection of these two streets in Provincetown, Mass. The proposed Mass Route 6 Infiltration Basin Block retaining wall (Mass Route 6 retaining wall) is located to the north of Mass Route 6 eastbound lanes and will be constructed in an area to be widened for the construction of a traffic circle. An above-ground stormwater basin will be constructed to the north of the proposed Mass Route 6 retaining wall. The proposed northern Shank Painter Road stone masonry will be constructed to the west of the southbound lane of Shank Painter Road approximately 250 feet to the north of the intersection of Shank Painter Road and Court Street. The southern Shank Painter Road Block retaining wall will be constructed to the east of the northbound lane of Shank Painter Road approximately 75 feet to the north of the intersection of Shank Painter Road and Court Street. Attachment A: Project Location Map presents the locations of the proposed structures.

The geographic coordinates of the pump station and retaining walls are presented below in Table 1: Site Coordinates.

Table 1: Site Coordinates

Site Location	Latitude	Longitude
Court Street Pump Station	42.050553°N	70.194534°W
Mass RT 6 Retaining Wall	42.054975°N	70.196173°W
Shank Painter Road North Retaining Wall	42.0512259°N	70.1955222° W
Shank Painter Road South Retaining Wall	42.050770°N	70.195302° W

Based on the preliminary plan, the proposed Court Street Pump Station will be a 33 feet by 12 feet precast or pre-engineered structure. The proposed finished floor elevation (FFE) of the pump station floor will be -11.68 feet mean sea level (MSL). Proposed finished grade is 7.00 feet MSL. The exposed surface of the pump station will include an equipment hatch at 10.00 feet MSL or one foot above the FEMA flood zone elevation and a vent hood at 11.00 feet MSL and a watertight cellar door at 9.50 feet MSL. Three underground wet wells will be constructed to the southwest of the pump station and will be 17'-6" long by 8'-0" wide. Wet Wells 1 and 2 will include a reinforced concrete bottom slab at elevation of -9.60 feet MSL, a wet invert elevation of -9.00 feet MSL, and top of hatch elevation of 6.00 feet MSL. Wet Well 3 will be located between Wet Wells 1 and 2 and the pump station and will include a bottom slab with bottom of footing elevation of -12.37 feet MSL, suction invert elevation of -11.12 feet MSL, and top of hatch elevation of 7.00 feet MSL.

The proposed Mass Route 6 retaining wall is expected to be a segmental precast block wall (gravity or Mechanically Stabilized Earth) 164 feet in length to be constructed to the northwest of and parallel with Mass Route 6. The bottom of concrete footing will be stepped from 7.00 feet MSL at northwestern terminus at Sta.10+00 to 2.50 feet MSL at Sta. 10+12.5 and will remain at 2.50 feet MSL to Sta. 10+55.5. The bottom of concrete footing will then be stepped from 2.50 feet MSL to 1.00 feet MSL and will remain at this elevation to Sta. 11+26.5. The bottom of the concrete footing will be stepped upward from 1.00 feet MSL to 7.00 feet MSL at the northeastern terminus of the retaining wall at Sta. 11+94. The maximum exposed height of the proposed retaining wall is approximately 8 feet with minimum embedment of approximately 4 feet below finished ground of the infiltration basin.

The proposed Shank Painter Road northern retaining wall is expected to be a stone masonry wall founded on a concrete footing 77 feet in length to be constructed to the west of and parallel with Shank Painter Road. The bottom of concrete footing will be stepped from 14.62 feet MSL at the northern terminus at Sta. 15+00 to 11.93 feet MSL at Sta. 15+77 at the southern terminus of the retaining wall at Sta. 15+77. The maximum exposed height of the proposed retaining wall is approximately 4 feet with a minimum embedment of approximately 4 feet below finished ground.

The proposed Shank Painter Road southern retaining wall is expected to be a segmental block retaining wall 66 feet in length to be constructed to the east of and parallel with Shank Painter Road. The bottom of concrete footing will be stepped from 9.00 feet MSL at northern terminus at Sta. 20+00 to1.00 feet MSL at Sta. 20+37 and will remain at 1.00 feet MSL to Sta. 20+46.5. The bottom of concrete footing will then be stepped from 1.00 feet MSL to 7.50 feet MSL between Sta. 20+46.5 and the southern terminus of the retaining wall at Sta. 20+66. The maximum exposed height of the proposed retaining wall is approximately 7.5 feet with a minimum embedment of approximately 4 feet below finished ground (at cross pipe). A 24-inch reinforced concrete pipe (RCP) will be constructed under Shank Painter Road at Sta. 20+41.5 with an approximate invert elevation of 6.00 feet MSL. The RCP will be constructed through the proposed retaining wall and proposed finished ground elevation will be lowered from an elevation of 11.00 feet MSL to the invert elevation of the pipe at a slope no steeper than 3H:1V.

Regional Geology

According to the United States Geological Survey (USGS), the sites is located within the Provincetown Quadrangle. The site is located within the Avalon Belt Geologic Province. USGS defines the Avalon Belt Geologic Province as: "Principally Precambrian Z granite and granitic gneiss and metasedimentary rocks of Precambrian Z to Ordovician

age. Intruded by Ordovician to Devonian granites. Cretaceous sediments and thick areas of Quaternary glacial sediments occur in southern coastal areas." Near surface bedrock geology in this region consists of unconsolidated sediments. Unconsolidated sediments include both non and poorly consolidated sediments from glacial or marine sediments. These surficial deposits are the primary aquifer for the area.

The Surficial Geologic Map of the Provincetown Quadrangle indicates the proposed work will be located atop Beach and Dune sand and gravel deposits. These types of deposits are defined below:

> **Beach and Dune deposits**—Sand and fine gravel deposited along the shoreline by waves and currents and by wind action. The texture of beach deposits varies over short distances and is generally controlled by the texture of nearby glacial materials exposed to wave action. Sand beach deposits are composed of moderately sorted, very coarse to fine sand, and are commonly laminated. Coarser layers may contain some fine gravel particles; finer layers may contain some very fine sand and silt. Gravel beach deposits are composed of granule- to cobble-size clasts in moderately sorted thin beds; deposits contain minor amounts of sand within gravel beds, and thin beds of sand as alternating layers. Beach deposits are rarely more than a few feet thick. Dune deposits are composed of moderately sorted to well-sorted, fine to medium sand, and are variably massive, laminated, and crossbedded. Dune deposits are as much as 100 ft thick. Unit includes artificial sand deposits in locally replenished beaches. Bedrock geology and surface geology maps are shown in Attachment B: Bedrock Geology and Surface Geology Maps.

Geotechnical Investigation

Test Borings and Monitoring Wells

On April 16 and April 17, 2025, Apex Companies, LLC (Apex) retained Northern Drilling Services of Northborough, Massachusetts to perform five (5) Standard Penetration Test (SPT) borings with a REDI drill rig with autohammer. Northern Drilling previously completed Borings B-1-SP, B-2-SP, B-3, and B-4 along Shank Painter Road on September 7, 2023, Boring B-5 along Mass Route 6 on September 7, 2023, and Borings B-1-C and B-2-C along Court Street on June 4, 2020. Boring completion and location data is provided in Attachment C: Boring Location Data Sheet while a boring location plan is provided in Attachment D: Boring Location Plan of this report.

The boreholes were drilled using the drive and wash method to advance the boreholes. Continuous split spoon samples were collected with two-foot split spoons in Borings B-103 through B-105 at proposed retaining wall locations. Split spoon samples were collected on four-foot centers to 6.00 feet below ground surface (BGS) and on five-foot centers thereafter in Borings B-101 and B-102 at the proposed Court Street Pump Station. Split spoon samples were collected with two-foot split spoons on 5-foot centers in Borings B-1-C, B-2-C. Borings B-1-SP, B-2-SP and B-3 through B-5 were collected with two-foot split spoons on 5-foot centers after vacuum extraction from surface to 4.00 feet BGS.

Standard Penetration Tests (SPT) were performed in conjunction with the split-barrel sampling. The SPT value (N) is defined as the number of blows of a 140-pound hammer, falling thirty inches, required to advance the split spoon sampler one foot into the soil (ASTM D1586). The sampler is lowered to the bottom of the drill hole and the number of blows is recorded for each of the four successive increments of six-inch penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the SPT indicate the relative density and comparative consistency of the soils and thereby provide a basis for estimating relative strength and compressibility of the soil profile components.

Overburden

Court Street Pump Station

Borings B-1-C, B-101 and B-2-C, B-102 were completed adjacent to Court Street for the proposed Court Street Pump Station. Borings B-1-C and B-101 were completed to the north of the proposed pump station. Boring B-1-C was completed in the westbound lane of Court Street while Boring B-101 was completed in the eastbound lane of Court Street. Borings B-2-C and B-102 were completed to the west of the proposed pump station in the southbound lane of Winthrop Street. Borings B-1-C and B-2-C were completed to depths of 27.00 feet BGS. Boring B-101 and was advanced to a total depth of 46.00 feet and Boring B-102 was advanced to a total depth of 41 feet and was converted to a monitoring well at the conclusion of the test boring. The B-102 monitoring well was installed with a 10' screen set from 19.00 to 9.00 feet BGS and a pipe riser with a height of 3.00 feet above grade. The groundwater depth recorded on April 16, 2025, after installation of the monitoring well was 2.90 feet BGS corresponding to an elevation of 3.70 feet MSL. No monitoring wells were installed in the other borings. Soil boring logs are included in Attachment E: Boring Logs.

The overburden present in the borings consisted predominately of poorly graded Sand (SP) and well graded Sand (SW). No sample recovery was obtained from Boring B-101 from 40.00 feet BGS to 46.00 feet BGS; however, the material was indicated as being medium dense to dense with blow counts ranging from 16 to 46. No sample recovery was obtained from Boring B-1-C from 15.00 to 17.00 feet BGS. The material was indicated as very dense. No sample recovery was obtained from Boring B-2-C from 15.00 to 17.00 feet BGS. The material was indicated as loose. Moisture conditions of the samples consisted of dry to wet with wet samples below 4.00 feet BGS in Borings B-101 and B-102 and 5.00 feet BGS in Borings B-1-C and B-2-C.

SPT N blow counts above the groundwater table were 6 in Borings B-1-C, 20 in B-2-C, 21 in B-101, and 17 in B-102. SPT N blow counts in Boring B-101 below the groundwater table ranged from 5 (4.00 feet BGS to 6.00 feet BGS) to 46 (44.00 feet BGS to 46.00 feet BGS) and the granular soil was described as loose to dense with loose samples occurring in spoon runs S-2 (4.00 feet BGS to 6.00 feet BGS) and S-3 (9.00 feet BGS to 11.00 feet BGS). Dense soil was prevalent below 29.00 feet BGS. SPT N blow counts in Boring B-102 below the groundwater table ranged from 4 (4.00 feet BGS to 6.00 feet BGS) to 43 (39.00 feet BGS to 41.00 feet BGS) and the granular soil was described as loose to dense with loose samples occurring in spoon runs S-2 (4.00 feet BGS to 6.00 feet BGS) and S-3 (9.00 feet BGS to 11.00 feet BGS). Dense soil was prevalent below 29.00 feet BGS. SPT N blow counts in Boring B-1-C below the groundwater table ranged from 6 (5.00 feet BGS to 7.00 feet BGS) to greater than 50 and the granular soil was described as loose to very dense with loose samples occurring in spoon run S-2 (5.00 feet BGS to 7.00 feet BGS). Dense soil was prevalent below 15.0 feet BGS. SPT N blow counts in Boring B-2-C below the groundwater table ranged from 4 (5.00 feet BGS to 15.00 feet BGS) to 31 (25.00 feet BGS to 27.00 feet BGS) and the granular soil was described as loose to dense with loose samples occurring in spoon runs S-2 (5.00 feet BGS to 7.00 feet BGS), S-3 (10.00 feet BGS to 12.00 feet BGS), and S-4 (15.00 feet BGS to 17.00 feet BGS). Dense soil was prevalent below 25.00 feet BGS.

Route 6 Retaining Wall (Proposed Block Retaining Wall between SR 6 and Infiltration Basin)

Boring B-5 was completed approximately 15 feet to the northwest of the western terminus of the proposed retaining wall at Sta. 500+42. This boring was completed to a depth of 16.00 feet BGS and had a surface elevation of 12.06 feet MSL. The boring was vacuum extracted to 4.00 feet BGS. Poorly graded coarse Sand (SP) was encountered to the boring termination depth of 16.00 feet BGS. This soil was medium dense (N=22, 22) from 4.00 feet BGS to 14.00 feet BGS and dense (N>50) below this depth. Soil samples were dry to 11.00 feet BGS/14.00 feet BGS and wet below this depth. Groundwater was encountered at 0.40 feet MSL or 11.70 feet BGS in Boring B-5. Boring B-105 was completed approximately 20 feet to the southwest of the western terminus of the proposed retaining wall. This boring was completed to a depth of 20.00 feet BGS and had a surface elevation of 13.15 feet MSL and encountered soft black silty loam topsoil to 1.00 feet BGS which was field classified as Silt (ML) underlain by loose poorly graded fine Sand (SP) to 4.00 feet BGS. Poorly graded fine Sand (SP) was also encountered to 18.00 feet BGS with no split spoon recovery from 18.00 feet BGS to 20.00 feet BGS. The soil below 4.00 feet BGS was

medium dense (N=13 to 20) except for a loose zone (N=8) from 14.00 feet BGS to 16.00 feet BGS. Soil samples were moist to 8.00 feet BGS and wet below this depth.

Shank Painter Road Northern Retaining Wall (Proposed Stone Masonry Retaining Wall adjacent to Southbound Lane of Shank Painter Road)
Boring B-104 was completed approximately 20 feet south of the southern terminus of the proposed retaining wall Sta. 22+84. This boring was completed to a depth of 20.00 feet BGS with a surface elevation of 15.85 feet MSL. This boring encountered asphalt to 1.00 feet BGS. Poorly graded fine Sand (SP) was then encountered to 20.00 feet BGS. This soil was loose to 8.00 feet BGS (N=8 to 10), medium dense from 8.00 feet BGS to 10.00 feet BGS (N= 12), and loose to 20.00 feet BGS (N=7 to 10) except for a medium dense zone (N=11) from 14.00 feet BGS to 16.00 feet BGS. Soil samples were dry to 8.00 feet BGS and wet below this depth. Groundwater was encountered at 7.49 feet MSL or 8.36 feet BGS.

Shank Painter Road Southern Retaining Wall (Proposed Segmental Block Retaining Wall adjacent to Southbound Lane of Shank Painter Road)
Boring B-4 was completed at the northern terminus of the proposed retaining wall Sta. 24+10. This boring was completed to a depth of 11.00 feet BGS with surface elevation of 13.94 feet MSL. This boring was vacuum extracted to 4.00 feet BGS. Poorly graded coarse Sand (SP) was encountered to 11.00 feet BGS. This soil was loose (N=9) from 4.00 feet BGS to 9.00 feet BGS and medium dense (N=17) below this depth. Soil samples were dry to 6.00 feet BGS/9.00 feet BGS and wet below this depth. Groundwater was encountered at 3.20 feet MSL or 10.70 feet BGS. Boring B-103 was completed approximately 20 feet to the southeast of the southern terminus of the proposed retaining wall at Sta. 24+78. This boring was completed to a depth 20.00 feet BGS with a surface elevation of 11.40 feet MSL. This boring encountered asphalt to 1.00 feet BGS. Poorly graded fine Sand (SP) was encountered to 20.00 feet BGS. This soil was loose to 4.00 feet BGS (N=8), medium dense from 4.00 feet BGS to 10.00 feet BGS (N= 20 to 30), loose from 10.00 feet BGS to 16.00 feet BGS (N=2 to 8), and medium dense from 16.00 feet BGS to 20.00 feet BGS (N=12 to 24). Soil samples were dry to 8.00 feet BGS and wet below this depth. Groundwater was encountered at 3.30 feet MSL or 8.10 feet BGS.

Soil Classification

Samples obtained during the drilling operations were collected, logged, and visually classified in the field in general accordance with ASTM D2488; which is based on the Unified Soil Classification System (USCS). Representative portions of the samples were collected in sample jars and select samples were sent to the laboratory for further examination and verification of field classifications. Boring logs indicating depth, N values, penetration and recovery depths, water levels, and soil descriptions are included in Attachment E: Boring Logs.

Bedrock

Split spoon refusal was not encountered in the borings. All borings were extended to their planned depths.

Water Level Measurements

Water levels were measured after drilling was completed. No groundwater composition samples were collected from borings. No environmental sampling was completed on groundwater or soil samples. Groundwater elevations at the Court Street pump station were 3.28 feet MSL at Boring B-101, 3.70 feet MSL at B-102, 2.85 feet MSL at B-1-C, and 3.59 feet MSL at B-2-C. Groundwater elevations at the Mass Route 6 retaining wall ranged from 5.15 feet MSL (Boring B-105) to 0.36 feet MSL (Boring B-5). Groundwater elevations at the Shank Painter Road retaining walls were 7.49 feet MSL (Boring B-104) for the northern retaining wall and ranged from 3.24 feet MSL (Boring B-4) to 3.28 feet MSL (Boring B-103) for the southern retaining wall.

Laboratory Testing

Soil samples were collected at select intervals throughout the borings for visual classification. Laboratory tests were carried out on soil samples from the Court Street pump station (6 soil samples tested), the Mass Route 6 retaining wall (2 soils samples tested), the northern Shank Painter Road retaining wall (1 soil sample tested) and the southern Shank Painter Road retaining wall (1 soil sample tested). All phases of the laboratory testing program were performed in general accordance with the applicable ASTM Specifications by Thielsch Engineering in Cranston, RI. The soil samples were collected for analysis of the following parameters:

- Grain Size Distribution Tests (ASTM D6913)

Information on the selected soil samples including boring number, sample number, sample depth, and testing performed is included in Table 2: Soil Samples Selected for Laboratory Analysis, below.

Table 2: Soil Samples Selected for Laboratory Analysis

Location	Boring #	Sample #	Depth (ft)	Classification	ASTM D6913 Gravel	ASTM 6913 Sand	ASTM 6913 Fines
Court Street Pump Station	B-101	S-2	4.0-6.0	Poorly Graded Sand	1.7	97.8	0.5
	B-101	S-4	14.0-16.0	Poorly Graded Sand	8.5	91.1	0.4
	B-101	S-5	19.0-21.0	Poorly Graded Sand with Gravel	20.4	76.6	3.0
	B-102	S-2	4.0-6.0	Poorly Graded Sand	1.3	98.3	0.4
	B-102	S-4	14.0-16.0	Poorly Graded Sand	2.8	94.1	3.1
	B-102	S-5	19.0-21.0	Poorly Graded Sand	5.8	90.8	3.4
	B-2-SP	S-1	4.0-6.0	Poorly Graded Sand with Gravel	29.6	69.2	1.2
Shank Painter Rd	B-3	S-2	9.0-11.0	Poorly Graded Sand	8.2	90.4	1.4
Shank Painter Rd. S. Retaining Wall	B-103	S-3	4.0-6.0	Poorly Graded Sand	0.1	97.3	2.6
Shank Painter Rd. N. Retaining Wall	B-104	S-3	4.0-6.0	Poorly Graded Sand	0.0	99.4	0.6
MASS Rt. 6 Retaining Wall	B-5	S-2	9.0-11.0	Poorly Graded Sand	0.0	98.2	1.8
	B-105	S-3	4.0-6.0	Poorly Graded Sand	0.0	98.3	1.7
	B-105	S-5	8.0-10.0	Poorly Graded Sand	1.1	98.4	0.5

Laboratory test results are presented in Attachment F: Laboratory Analysis of this report. The samples collected will be stored for 30 days from the date of issue of this report and then disposed of unless otherwise instructed in writing by the client.

Analysis and Recommendations

Foundation Design Recommendations

Court Street Pump Station

Based on the subsurface information encountered during drilling and our experience, it is our opinion that the proposed pump station building, and wet wells can be supported on a conventional reinforced concrete (R/C) mat underlain by a minimum 12-inch thickness of compacted crushed stone. Foundations for unheated structures should be placed at a minimum depth of 4 feet below the lowest adjacent grade. The proposed grade is expected to be 7.0 feet MSL.

Surface structures including the pump station building can be supported on a conventional R/C mat with frost wall and surface slabs and underlain by a compacted layer of crushed stone or on shallow spread and continuous footings. Existing soil with an organic content greater than 5% by weight within four feet of bottom of slab elevation shall be over-excavated and replaced with structural fill with USCS designations of SP, SW, or GW. Densification of near surface soils should be performed with a smooth drum roller with a minimum drum weight of 10 tons. The roller should be operated in vibratory mode to compact loose surface soils unless instability or pumping occurs during vibratory compaction. After soil densification, loose or soft soil identified from proof roll with fully loaded tri-axle truck with minimum axle weight of 10-tons, a10-ton smooth drum roller, or a walk behind roller shall be over-excavated and replaced with structural fill per above USCS designations. The top 18-inches of subgrade shall be scarified, moisture conditioned to +/- 3% of Optimum Moisture Content (OMC) and recompacted to a minimum 95% of the soil's Maximum Dry Density (MDD), Modified Proctor (ASTM D1557) as determined in the laboratory. A geotextile fabric shall be installed between the subgrade and the layer of crushed stone. Foundation design parameters are included in Table 3: Foundation Design Parameters – Court Street Pump Station for the Court Street Pump Station building.

Grade for any ground supported surface facilities can be raised with the crushed stone layer or on-site soils and/or imported fill having the USCS designations of SP, SW, or GW. Dynamic Cone Penetrometer testing should be performed at proposed slab corners and midpoints and at slab interior points (minimum of 3) to verify adequate compaction and bearing capacity. Foundation design parameters are included in Table 3: Foundation Design Parameters – Court Street Pump Station (allowable bearing capacity) and Table 4: Pump Station Building Below-Ground Wall Design Parameters –Wet Wells (below grade rigid walls) for the proposed pump station building.

Table 3: Foundation Design Parameters – Court Street Pump Station

Granular Soils (SP, SW)	
Parameter	**Med. Dense (below 15 feet BGS)**
Allowable Bearing Capacity	3.0 ksf
Friction Angle°	30
Unit Weight (Moist/Submerged)	120/62.6 pcf
Modulus of Subgrade Reaction, k_s	125 pci

Table 4: Pump Station Building Below-Ground Wall Design Parameters – Wet Wells

Below-Grade Rigid Wall Design Parameters (Assumed Level Backfill)	
Backfill Soil Parameter	**SP Backfill**
Friction Angle°	30
Cohesion	0.0 psf
Unit Weight (Moist/Submerged)	120/62.6
At-Rest Lateral Earth Pressure Coefficient (Ko)	0.5
Active Lateral Earth Pressure Coefficient (Ka)	0.333
Passive Lateral Earth Pressure Coefficient (Kp)	3.00
Interface Friction Angle (Concrete on Sandy Soil/Gravel)	20
Sliding Friction Coefficient (Concrete on Sandy Soil/Gravel)	0.30
Minimum Sliding Friction Factor of Safety	1.5

The proposed Court Street stormwater pump station will have a grade elevation of 7.00 feet MSL, a bottom floor elevation of -11.68 feet MSL and will be supported on a mat foundation with a bottom of footing elevation of -13.00 feet MSL +/-. The wet well sections will be approximately 17.50 feet long by 8.00 feet wide and will be constructed beyond the proposed Court Street Pump Station. The outermost wet wells will have an approximate depth of 18 feet from top of manhole elevation of 6.00 feet MSL to top of slab at bottom of wet well at -9.60 feet MSL. A minimum 12-inch mat foundation is proposed to be constructed at the bottom of the wet wells with a proposed bottom of footing elevation of -10.60 feet MSL. The interior wet well will have an approximate depth of 19.40 feet from top of manhole elevation of 7.00 feet MSL to top of slab at bottom of wet well at elevation -12.37 feet MSL. A minimum 12-inch mat foundation is proposed to be constructed at the bottom of wet well with a proposed bottom of footing elevation of -13.37 feet MSL.

Due to the presence of fine sandy soil at the proposed bottom of footing elevation (BFE) of the pump station and wet wells, the excavation for the wet wells should be extended 12-inches below the proposed BFE for the pump station and each wet well. The over-excavation should be backfilled with well graded crushed stone meeting the USCS designation on GW. A geotextile fabric shall be installed between the subgrade and the layer of crushed stone. The base mat for the wet wells and pump station shall be designed to extend beyond the walls to resist buoyancy. The crushed stone layer shall extend a minimum of 3 feet beyond the footprint of the pump station and wet well walls. Foundation design parameters at the base of the stormwater pump station and wet wells are included in Table 3: Foundation Design Parameters – Court Street Pump Station. Developed parameters assume over-excavation of fine sandy soil a minimum of 12 inches below bottom of mat elevation and backfill with well graded gravel (GW).

The lateral earth pressures on the Court Street wet wells and any other below grade structure or retaining wall will be dependent on wall design (yielding or rigid), type of backfill soil, backfill placement, and drainage characteristics of backfill material including underdrain design and construction. Rigid walls restrained against lateral movement should be designed for at-rest lateral earth conditions using at-rest lateral earth pressure coefficient (Ko). Retaining walls and below grade walls that are free to deflect should be designed using active earth pressure coefficients (Ka). A clean well-graded granular aggregate (GW) should be used as backfill material to achieve optimal design and construction conditions. A wall drainage system will minimize hydrostatic pressures caused by groundwater formation behind walls. Since adequate subsurface drainage cannot be provided, the walls and structure shall be designed to resist hydrostatic forces. Assume design groundwater elevation is at finished grade. Design proposed pump station and wet wells for H20 traffic loadings.

Roadway Retaining Walls

The proposed Mass Route 6 retaining wall is expected to be a segmental block wall (gravity or Mechanically Stabilized Earth (MSE)) 194 feet in length with a maximum wall height of approximately 12 feet with minimum

embedment of approximately 4 feet below finished ground of the infiltration basin. The proposed Shank Painter Road northern retaining wall is expected to be a stone masonry wall 77 feet in length with a maximum wall height of approximately 7 feet with minimum embedment of approximately 4 feet below finished ground. The proposed Shank Painter Road southern retaining wall is expected to be a segmental block retaining wall 66 feet in length with a maximum wall height of approximately 12 feet with minimum embedment of approximately 4 feet below finished ground. Design criteria for each wall is based on classification and wall type (rigid or flexible). R/C walls are typically considered rigid, and the bottom of foundation must be embedded below proposed finished grade at a depth equal to the design frost depth (typically 48 inches for Provincetown, Mass.). MSE walls and gravity walls are typically considered flexible. Foundation embedment shall be per manufacturer's specifications but shall be at a minimum depth of 4 feet per MassDOT requirements. Retaining wall design parameters for the Shank Painter Road and Mass Route 6 retaining walls are provided below and assume backfill will be site soils or imported soils or manufactured gravel meeting the USCS definition of SP, SP-SM, SW, or GW. Retaining wall design parameters are included in Table 5A: Roadway Retaining Wall Design Parameters for SR 6 Retaining Wall. Table 5B: Roadway Retaining Wall Design Parameters for Shank Painter Road Northern Retaining Wall, and Table 5C: Roadway Retaining Wall Design Parameters for Shank Painter Road Southern Retaining Wall. The design of each retaining wall will be performed by the selected Contractor/Design-Build team. The Design Build team will complete bearing, sliding, overturning, and global stability analyses for each wall.

Table 5A: Roadway Retaining Wall Design Parameters for SR 6 Retaining Wall

	Retaining Wall Design Parameters (Assumed Level Backfill)	
Borings B-5 and B-105 Foundation, Reinforced, and Retained Soils (SP)	**Value (Loose SP)**	**Value Med. Dense (SP)**
Friction Angle°	28	30
Cohesion	0.0 psf	0.0 psf
Unit Weight (Moist/Submerged)	105/47.6	115/57.6 pcf
At-Rest Lateral Earth Pressure Coefficient (Ko)	0.53	0.50
Active Lateral Earth Pressure Coefficient (Ka)	0.36	0.33
Passive Lateral Earth Pressure Coefficient (Kp)	2.77	3.0
Sliding Friction Coefficient (Concrete on Sandy Soil/Gravel)	0.35	0.35
Minimum Sliding Friction Factor of Safety	1.5	1.5
Allowable Bearing Capacity (psf)	3,000	4,000
Youngs Modulus (ksf)	600	1000
Minimum Wall Embedment (Rigid)	48 inches	48 inches
Note: Backfill soils assumed to be on-site soils (SP) or more granular and compacted to at least medium dense state.		

Table 5B: Roadway Retaining Wall Design Parameters for Shank Painter Road Northern Retaining Wall

Retaining Wall Design Parameters (Assumed Level Backfill)		
Boring B-104 Foundation, Reinforced, and Retained Soils (SP)	**Value (Loose SP)**	**Value Med. Dense (SP)**
Friction Angle°	28	30
Cohesion	0.0 psf	0.0 psf
Unit Weight (Moist/Submerged)	105/47.6	115/57.6 pcf
At-Rest Lateral Earth Pressure Coefficient (Ko)	0.53	0.50
Active Lateral Earth Pressure Coefficient (Ka)	0.36	0.33
Passive Lateral Earth Pressure Coefficient (Kp)	2.77	3.0
Sliding Friction Coefficient (Concrete on Sandy Soil/Gravel)	0.35	0.35
Minimum Sliding Friction Factor of Safety	1.5	1.5
Allowable Bearing Capacity (psf)	3,000	4,000
Youngs Modulus (ksf)	600	1000
Minimum Wall Embedment (Rigid)	48 inches	48 inches
Note: Backfill soils assumed to be on-site soils (SP) or more granular and compacted to at least medium dense state.		

Table 5C: Roadway Retaining Wall Design Parameters for Shank Painter Road Southern Retaining Wall

Retaining Wall Design Parameters (Assumed Level Backfill)		
Borings B-4 and B-103 Foundation, Reinforced, and Retained Soils (SP, SW)	**Value (Loose SP)**	**Value Med. Dense (SP)**
Friction Angle°	28	30
Cohesion	0.0 psf	0.0 psf
Unit Weight (Moist/Submerged)	105/47.6	115/57.6 pcf
At-Rest Lateral Earth Pressure Coefficient (Ko)	0.53	0.50
Active Lateral Earth Pressure Coefficient (Ka)	0.36	0.33
Passive Lateral Earth Pressure Coefficient (Kp)	2.77	3.0
Sliding Friction Coefficient (Concrete on Sandy Soil/Gravel)	0.35	0.35
Minimum Sliding Friction Factor of Safety	1.5	1.5
Allowable Bearing Capacity (psf)	3,000	4,000
Youngs Modulus (ksf)	600	1000
Minimum Wall Embedment (Rigid)	48 inches	48 inches
Note: Backfill soils assumed to be on-site soils (SP) or more granular and compacted to at least medium dense state.		

Retaining walls must be designed to withstand lateral earth pressures exerted by the backfill and any loadings including construction equipment loadings and traffic loadings. If construction and traffic loading are not provided by the design engineer, assume a loading of 360 pound per square foot (psf) as a minimum (to be modified by any local or municipal code). Rigid walls restrained against lateral movement should be designed for at-rest lateral earth conditions using at-rest lateral earth pressure coefficient (Ko). Retaining walls that are free to deflect should be designed using active earth pressure coefficients (Ka). In the calculation of passive earth pressure, the upper 4 feet of soil should be neglected due to potential for frost heave or insufficient compacted or disturbed soil at or near the surface. To utilize a fully developed passive earth pressure, the wall must move laterally approximately 0.04 x height of wall. For general design purposes, the passive earth pressure behind wall should not be considered in the design. A clean well-graded granular aggregate should be used as backfill material (SP-SM or more granular). Granular soils meeting a minimum, those specifications provided in Table 4: Pump Station Building Below-Ground Wall Design Parameters – Wet Wells or manufacturer's specifications if more stringent. This backfill must be placed in the critical zone which is defined as the area between the back of the retaining wall and a line projected at a 45-degree line projecting rearward and upward from the bottom back edge

of the retaining wall. If MSE walls are constructed, granular backfill meeting or exceeding the manufacturers minimum specifications shall be used in the reinforced soil zone containing geogrid or geotextile reinforcement. The backfill in the critical zone should be compacted to a minimum of 95% MDD, Modified Proctor (ASTM D1557) as determined in the laboratory at +/- 2% of OMC or to manufacturer's specifications. Soils not meeting these criteria or soils that are soft/loose, contain unsuitable and/or deleterious material, and do not meet MDD/OMC requirements should be removed from the critical zone of the retaining wall and replaced with structural fill meeting these requirements.

A wall drainage system is recommended to minimize hydrostatic pressures caused by groundwater formation behind the retaining wall. If adequate subsurface drainage is not provided, the walls shall be designed to resist hydrostatic forces. Wall drains can consist of 12 inches of AASHTO #57 stone wrapped in non-woven filter geotextile or a similar geocomposite material placed behind the wall. A foundation drain should also be constructed, and the wall drains should be connected to the foundation drain. Weep holes should be provided in the retaining wall if the retaining wall design does not permit backfill drainage through construction joints or joints in the block used to construct the retaining wall. If hydrostatic pressure due to groundwater development occurs the lateral earth pressure should be calculated using a total soil unit weight of 125.00 pcf above the seasonal high groundwater table (SHGWT) elevation and 67.60 pcf below this elevation. Hydrostatic pressures should be calculated using the SHGWT elevation. Total lateral wall pressure will equal the sum of the lateral earth pressure and hydrostatic pressure. Surcharge loading at the top of the walls during construction and in the final as-built condition should be determined and included in the design of the walls.

Source literature geotechnical soil parameters included in this geotechnical report are included in Attachment G: References for Geotechnical Design Parameters.

Settlement Analysis

The borings advanced at the proposed Court Street stormwater pump station Mass Route 6 retaining wall and Shank Painter Road retaining walls encountered predominantly loose to dense sand. Settlements beneath the proposed pump station are expected to be within the acceptable range for the proposed structure if after clearing and grubbing, the surface soils are compacted with a 20-ton smooth drum roller operated in vibratory mode if no pumping occurs or static mode if pumping occurs due to high groundwater table. The settlement estimate indicates that less than 1 inch for the proposed building should be anticipated by end of construction activities and post construction settlements should be negligible.

Seismic Conditions

Seismic design conditions for this site should utilize a Site Class "D," according to the 2021 International Building Code (IBC). The IBC Site Class determination is based on the top 100' of rock and soil profile. Although the borings performed at the site are much shallower than 100', generalized information about the site and the site conditions observed during drilling operations suggest this site class.

Seismic Design Parameters

The ASCE 7 Hazard tool (https://asce7hazardtool.online/) based on ASCE/SEI 7-22 indicates a maximum peak ground acceleration (PGA) on the order of 0.10g for a seismic event with 2% probability of exceedance in 50 years (design basis earthquake). Seismic design parameters for the Court Street stormwater pump station are based on ASCE 7 methodologies utilizing a Risk Category III. Since the proposed retaining walls will be along existing MassSDOT roadways or local roads, utilize AASHTO LRFD Bridge Design Specifications, current edition for design of these structures. Seismic design parameters for the proposed retaining walls are based on LRFD methodologies. Based on the completed exploratory borings, we recommend the design parameters shown in Table 6: Seismic Design Parameters below. We determined these values using the site latitude and longitudes indicated in Table 1: Site Coordinates.

Table 6: Seismic Design Parameters

Site Class D Risk Category III		
Site	**Court St. Pump Station**	**Mass Rt 6 and Shank Painter Road Retaining Walls**
PGA_M – Site Modified Peak Ground Acceleration	0.110	0.110
S_{MS} – Site Modified Spectral Acceleration Value at 0.2 Second	0.230	0.230
S_{M1} – Site Modified Spectral Acceleration Value at 1.0 Second	0.098	0.098
S_{DS} – Numeric Seismic Design Value at 0.2 Second SA	0.160	0.160
S_{D1} – Numeric Seismic Design Value at 1.0 Second SA	0.065	0.065
T_L – Long Period Transition Period	6.000	6.000
S_S – MCE_R Ground Motion for 0.2 Second Period	0.190	0.190
S_1 – MCE_R Ground Motion for 1.0 Second Period	0.046	0.046
AASHTO LRFD Fpga for Peak Ground Acceleration	N/A	1.900
AASHTO LRFD Fa for 0.2 sec. (Short) Period Spectral Acceleration	N/A	1.600
AASHTO LRFD Fv for 1.0 sec. (Long) Period Spectral Acceleration	N/A	2.400

Liquefaction Potential

Liquefaction can occur when saturated, loose to medium dense, granular soils, generally within 50 feet of the ground surface or specifically defined cohesive soils are subject to ground shaking. Based on the soil, bedrock and ground water conditions encountered during the subsurface exploration and current industry accepted liquefaction evaluation methods, liquefaction is not anticipated to be an issue for this site. Generally, soils more susceptible to liquefaction are saturated, loose sandy soils including granular silts. Soils encountered at the site are not considered liquefiable with proper surface compaction/densification.

Support of Excavation

Based on the preliminary design options, the proposed Court Street pump station and wet wells will be up to 20 feet deep and will require an excavation of up to 22 feet below grade for subgrade preparation. Due to the location of adjacent roadways and underground utilities, an engineered shoring system will be required for the support of excavation. The support system shall be designed to resist lateral earth pressures and must meet the Occupational Safety and Health Administration (OSHA) requirements. The support system for the anticipated excavation shall also be designed to be left in place if required to avoid undermining the existing building. Interlocking steel sheet piling is a suitable option for lateral support of the excavation and to help control groundwater flow into the excavation. Steel sheeting would need to be installed a minimum of 2.0 feet below the lowest level of excavation. The support of the excavation system shall be designed by a Licensed Professional Engineer hired by the Contractor.

Minimum required coverage over all watermain installations is 5.00 feet. Excavated materials at the proposed Court Street stormwater pump station are expected to mainly consist of fine sand (SP) to depths of approximately 19.00 feet BGS and fine sand (SP) and/or well graded sand (SW) below this depth. Fine to coarse sand is expected to be encountered at excavations for the proposed retaining walls.

Based on the depth of excavation, an engineered earth support system or trench box will be required to provide stable working conditions for excavations deeper than 4.00 feet BGS if benching cannot be completed in accordance with OSHA standards. The excavation support system shall be designed to resist lateral earth pressures and must meet all OSHA requirements. Where trench box systems are not applicable, a support system consisting of soldier piles and lagging or internally braced sheet piles is recommended for this project, and the final installation shall be confirmed by the design Engineer. Steel sheeting would need to be installed a minimum

of 2.00 feet below the lowest level of excavation. The Contractor shall retain a Massachusetts Registered Professional Engineer to design a functioning excavation and support system. The design shall be submitted for review prior to construction. See Table 7: Temporary Shoring Design Parameters – Granular Soils for temporary shoring design parameters.

Table 7: Temporary Shoring Design Parameters – Granular Soils

Parameter	Loose SP, SW Soils	Med. Dense SP, SW Soils	Dense SP, SW Soils
Cohesion lbs/ft^2	0.0	0.0	0.0
Friction Angle°	26	30	33
Unit Weight lbs/ft^3 (moist/submerged)	110/52.6	120/62.6	130/67.6
At Rest Earth Pressure, K_o	0.562	0.500	0.455
Active Earth Pressure, K_a	0.395	0.333	0.295
Passive Earth Pressure, K_p	2.561	3.000	3.392

Classify soils as OSHA Type B soils if during trench excavation angular gravel, silt, silt loam soils are present and where the trench is free from water seepage and where soil layers dip into an excavation on a slope of 4H:1V or less and have an unconfined compressive strength of at least 0.50 tons psf. Classify soils as OSHA Type C soils if during trench excavation gravel, sand and loamy sand are present or where the trench has water seepage or submerged soils or where soil layers dip into an excavation on a slope of greater than 4H:1V and have an unconfined compressive strength of at 0.50 tons psf or less or where soils are comprised of predominantly gravel or sand and loamy sand. Follow OSHA 29 CFR, Part 1926 Guidelines for Trench Excavation. Trenches with Type B soils can be excavated at an allowable slope angle of no steeper than 1H:1V (45 degrees). The bottom vertical height of the trench must not exceed 4 feet for the first bench. Subsequent benches may be up to a maximum vertical of 4 feet in Type B soils to a total trench depth of 20 feet. Bench excavation is only permitted in cohesive soils. Trenches with Type C soils can be excavated at an allowable slope angle of no steeper than 1.5H:1V (34 degrees). Trenches in Type C soils cannot be benched. Due to the granular nature of site soils, assume all site soils are OSHA Type C Soils. Trench stability and sidewall caving may occur where cohesionless granular soils are encountered and where perched groundwater is present.

Dewatering

A monitoring well was installed in Boring B-102 at the proposed Court Street Pump Station. Elevations in this monitoring well on April 16, 2025, after drilling measured the depth to groundwater as 2.90 feet. SHGWT elevation is approximately 4.00 feet MSL while the FEMA Flood Zone Elevation is 9.00 feet MSL. Based on these measurements, it is likely that groundwater will be encountered during excavation at very shallow depths. Surface water and groundwater shall be controlled such that excavation to final grade is made in-the-dry. The groundwater table should be controlled and depressed to at least 2 feet below bottom of excavation to limit trench instability (running sands) associated with saturated loose fine sands. The bearing soils shall be undisturbed so that softening, instability or disturbance of the subgrade due to the presence of water does not occur. Excavations for foundations and structures shall be dry for a minimum of four days after the cast-in-place concrete mats are installed. In no event shall water be allowed to enter an excavation and rise to cause unbalanced pressure on foundations and structures until the cast-in-place concrete has set at least 24 hours. Due to the presence of groundwater within the proposed excavation, it is anticipated that deep wells, vacuum well points, or a combination of these methods will be required for excavations below the groundwater table. The wells shall be designed with appropriate filters to prevent any loss of fines during pumping. Any water seeping into the excavation above the groundwater table can typically be controlled with a sump pump and sump pits. Due to the sensitive location of the work, groundwater from the sumps and wellpoints shall be discharged into a bladder bag within a hay or strawbale (or filter sock) containment to prevent any discharge of fines into adjacent properties or

nearby water bodies or wetlands. All water discharged from temporary dewatering and drainage systems shall be disposed of in accordance with sedimentation and control plans and methods approved by the Conservation Commission. Sanitary sewer systems or private on-site septic systems shall not be used to dispose of drainage. A Professional Engineer, hired by the Contractor, shall be required to design the dewatering system. It is the sole responsibility of the Contractor to review site conditions and geotechnical data and reports and provide a dewatering design and system(s) that will effectively dewater proposed excavations to below BFE. Only granular fill shall be placed below the groundwater table elevation. This fill shall be wrapped in 4-oz/square yard non-woven geotextile to prevent the intrusion of adjacent soil fines.

Construction Considerations

All subgrade areas should be prepared first by removing unsuitable materials to expose the naturally deposited subgrade. The outer limit of the excavation should be at least 5 feet beyond the outer perimeter of the structures (i.e. wet well or building footprint), where possible, without disturbing the foundations of adjacent structures or utilities. Foundation bearing soils should not be allowed to freeze before, during, or after foundation construction.

The on-site SP and SW soils may be reused as fill material across the site and as backfill provided it meets the gradation specifications for common fill and manufacturer's specifications for backfill material provided the material does not contain unsuitable or deleterious material and organic content is less than 5%. Some reconditioning and moisture adjustment of the excavated soils may be required to achieve the desired degree of compaction.

Temporary construction slopes should be designed and excavated in strict compliance with the rules and regulations of OSHA, 29 CFR, Part 1926. All excavations shall conform to the OSHA guidelines.

All fill placed in areas that are designated to be paved should be structural fill. Structural fill is defined as well graded natural sand and gravel with a maximum particle size of four inches and no more than 10 percent passing the No. 200 Sieve. Structural fill should be placed in 6 to 8-inch loose lifts and compacted to 95% of the MDD, Modified Proctor (ASTM D1557) for the specific material being used.

Due to the presence of groundwater and the proposed depth of the excavation, the pump station and wet well systems shall be designed to resist buoyancy. Soil effective unit weight should be used for material below SHGWT. The below grade structures should be tested for water tightness upon completion of the work and before backfilling. Testing procedure shall be in strict conformance with the AWWA Standards.

Pipeline Construction

The proposed waterlines will primarily be installed by conventional open cut excavation (direct burial). Based on the information obtained from the subsurface exploration program, the underlying soils are mostly suitable to support the proposed waterlines and associated features. Should the Contractor encounter localized conditions such as loose, soft soils, wet zones, unstable subgrade or trench sidewalls or soils with organic content greater than 5%, or any unsuitable material (highly plastic clay, elastic silt, degradable or pyritic rock fragments) during the installation of the pipeline, the Engineer should inspect the pipe trench prior to placing bedding for the proposed water lines and determine the appropriate corrective action.

Removal of ledge and bedrock will not likely be required for waterline installations, pump station and wet well construction, and retaining wall construction to proposed excavation depths under 40.00 feet BGS as no rock was encountered in Borings B-101 and B-102 to boring termination depths of 46.00 feet BGS for Boring B-101 and 41.00 feet BGS for Boring B-102. Rock was not encountered in retaining wall borings to the depth explored which ranged from 11.00 feet BGS to 20.00 feet BGS.

Other Construction Considerations

It is recommended that a minimum 6-inch pipe bedding material be placed under the invert of the waterline and extending to the mid-height of the waterline. This bedding should be thoroughly compacted with a ram or pneumatic tamper. If trench dewatering is expected, the pipe bedding shall consist of crushed stone or processed gravel placed from six inches below the waterline to the mid-height of the waterline. Structural fill should be placed above the pipe bedding to an elevation of one foot below the roadway bound pavement layers (bituminous concrete or Portland Cement concrete). Structural fill is defined as well graded natural sand and gravel with a maximum particle size of four inches and no more than 10 percent passing the No. 200 Sieve. Structural fill should be placed in 6- to 8-inch loose lifts and compacted to 95 percent if the MDD, Modified Proctor (ASTM D1557) for the specific material being used as indicated in Table 8: Structural Fill Placement Guides, below. The intent of this recommendation is to reduce the potential for consolidation and settlement.

Table 8: Structural Fill Placement Guides

Area	Percent Compaction Based on ASTM D1557
Below Structures	95
Utility Trenches within Roadway	95
Grade-Raised fill placed within 1-ft of the base of the pavement	95
Other Landscaped Areas	92

Pavement reconstruction shall consist of five inches of HMA Binder Course installed in two 2-1/2-inch lifts on 12-inches of Processed Gravel base course. After waterline construction is complete, the existing roadway will be milled full width at a depth of 1-1/2 inches and a surface course of 1-1/2 inches of HMA Wearing will be placed with a tack coat on existing milled bituminous pavement. Bound bituminous concrete and unbound pavement subbase shall conform to MassDOT specifications.

Processed Gravel for pavement sub-base shall be hard, durable stone of proper size and gradation and coarse sand, unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles, and other fine harmful substances. Processed gravel shall meet the gradation requirements per the MassDOT Division III Materials Table M1.03.1.

Gravel borrow shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. Gravel borrow shall meet the gradation requirements per MassDOT Division III Materials Table M1.03.0-1. All gravel borrow stone shall be washed.

The Contractor shall perform and submit results of laboratory testing on the fill materials to determine the appropriate moisture density relationship of the fill being placed including MDD and OMC. All finished and disturbed ground surfaces should be adequately prepared to reduce erosion.

Attachments

Attachment A: Project Location Map
Attachment B: Bedrock Geology and Surface Geology Maps
Attachment C: Boring Log data Sheet
Attachment D: Boring Location Plan
Attachment E: Boring Logs
Attachment F: Laboratory Analysis
Attachment G: References for Geotechnical Design Parameters

Limitations

This report has been prepared in accordance with generally accepted geotechnical engineering practices, and it is intended to be used to assist in design of the proposed Court Street pump station, Shank Painter Road retaining walls, and Mass Route 6 retaining wall in Provincetown, MA. The findings and recommendations contained in this report are based on site conditions encountered during the subsurface exploration. These opinions were arrived at in accordance with accepted engineering procedures at this time. Conclusions and additions made from this data by others are their responsibilities. Should the location of the proposed pipes and structures change, or if the soil conditions become notably different during construction from those described herein, Apex should be notified immediately. Should potentially hazardous materials be encountered at the site during excavation, an environmental investigation should be performed immediately.

Prepared by:

Daniel E. Sheftick, P.E.
Senior Geotechnical Engineer
Apex Companies, LLC

Ziad F. Kary, P.E.
Senior Principal
Apex Companies, LLC

ATTACHMENT A

PROJECT LOCATION MAP

Limit of Work

Segmental Block Retaining Wall
STA 500+42 to 502+03
42.054975, -70.196173

Stone Masonry Wall
STA 22+11 to 22+84
42.051259, -70.195522

Proposed Retaining Wall
STA 24+10 to 24+78
42.050770, -70.195302

Proposed Pump Station
42.050553, -70.194534

Clapps Pond

Shank Painter Pond

Town Hill

Provincetown Schools

JEROME SMITH RD
ALDEN ST
JEROME RD
WINSLOW ST
PROVINCE RD
SILVA LN
SHIPS
HIGH POL
WINTHROP ST
CARVER ST
SHANK PAINTER RD
BRADFORD ST
CENTRAL ST
ATLANTIC A
RACE RD
MOR
CO

6

N

ENVIRONMENTAL PARTNERS
— An Apex Company —

Figure 1
USGS Locus Map
Provincetown, MA
3/27/2024

0 500 1,000 2,000
Feet

Bank National Marine Sanctuary
Plymouth

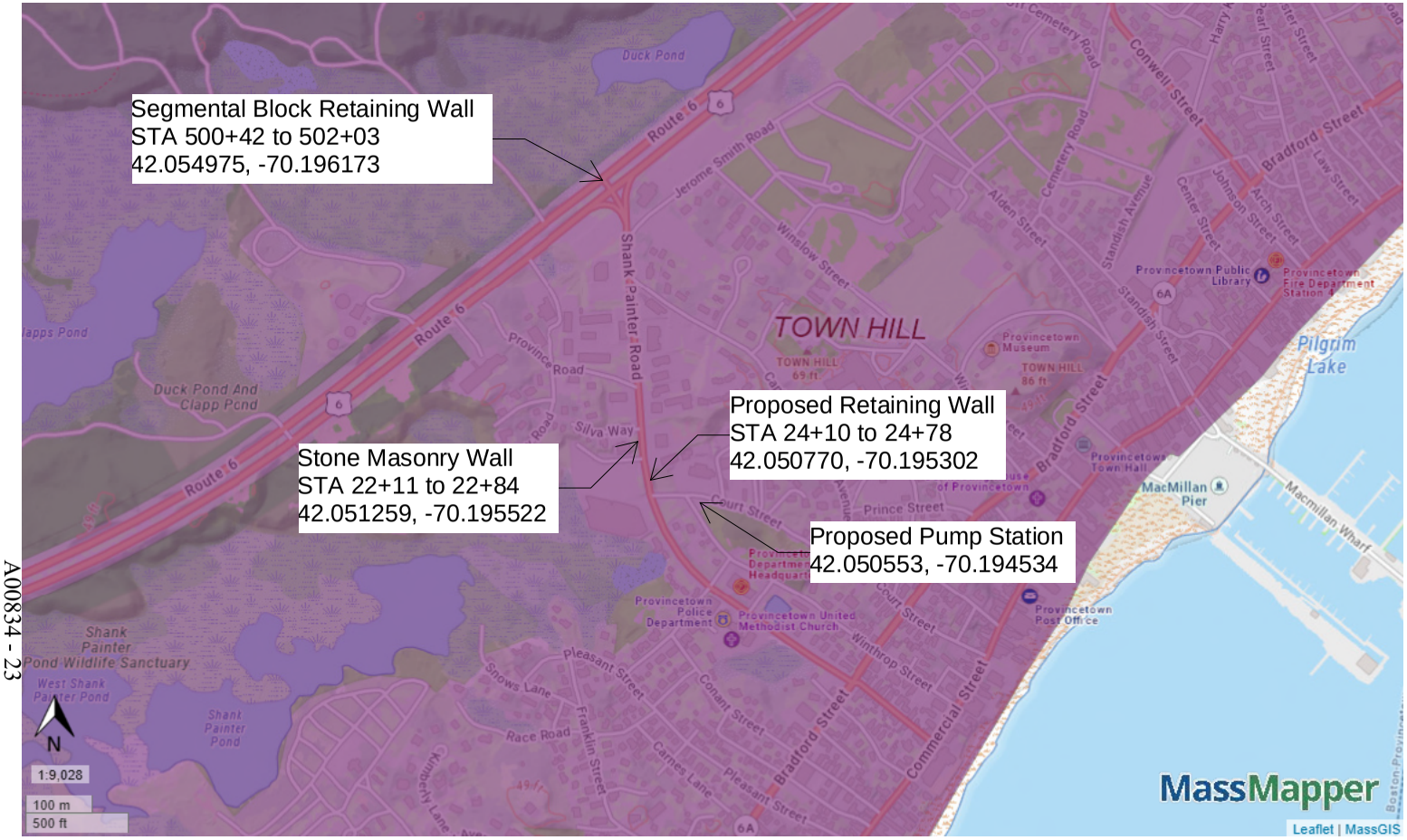
I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

Disclaimer: This map is intended for planning purposes

ATTACHMENT B

BEDROCK GEOLOGY AND SURFACE GEOLOGY MAPS

Bedrock Lithology Group A General



Bedrock Lithology Group A General

- Basin Sedimentary
- Calcpelite
- Carbonate Rocks
- Granite
- Mafic Rocks
- Metamorphic Rocks Undivi
- [redacted]s
- Water

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Surficial Geology



ATTACHMENT C

BORING LOG DATA SHEET

Boring Summary

Boring ID	Type	Lat / Long	Surface Elevation	Location	Depth
B-1-C	Auger	42.050650, -70.194610	5.85’	Near the 45 Court St parking lot	27’
B-2-C	Auger	42.050556, -70.194751	6.59’	Intersection of Winthrop St and Court St, near the Wet Wells	27’
B-1-SP	Drive and Wash	42.048730, -70.192549	7.20’	Gravel parking lot (15 Shank Painter Rd), STA 35+54.	11’
B-2-SP	Drive and Wash	42.049103, -70.193448	6.30’	Fire Department (25 Shank Painter Rd), STA 32+92.	11’
B-3	Drive and Wash	42.050283, -70.195077	10.15’	Left of 35 Shank Painter Rd, STA 26+24.	11’
B-4	Drive and Wash	42.050881, -70.195322	13.94’	63 Shank Painter Rd, STA 24+07. Near Prop retaining wall STA 24+10.	11’
B-5	Drive and Wash	42.054866, -70.196170	12.06’	North of Route 6 and Shank Painter Road intersection. Near Segmental Block Wall STA 500+42.	16’
B-101	Drive and Wash	42.050579, -70.194435	5.81'	Across from 45 Court St, near the Pump Station	36’
B-102	Drive and Wash	42.050488, -70.194435	6.59'	Intersection of Winthrop St and Court St, near the Wet Wells	41’
B-103	Drive and Wash	42.050631, -70.195191	11.40'	Court St and Shank Painter Rd intersection, near the Court Street Pond retaining wall. Shank Painter STA 25+07.	20’
B-104	Drive and Wash	42.05114, -70.195496	15.85'	Shaw’s parking lot (56 Shank Painter Rd), Shank Painter STA 23+04.	20’
B-105	Drive and Wash	42.05779, -70.196014	13.15'	Route 6 and Shank Painter Road intersection. Near Segmental Block Retaining Wall STA 500+82.	20’

ATTACHMENT D

BORING LOCATION PLAN

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

PLAN AND PROFILE OF

SHANK PAINTER ROAD AND ROUTE 6

IN THE TOWN OF

PROVINCETOWN

BARNSTABLE COUNTY

FEDERAL AID PROJECT NO. STP/CMQ/TAP-0035(070)X

PS&E SUBMITTAL

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	STP/CMQ/TAP-0035(070)X	001	280
PROJECT FILE NO.	608744		

TITLE SHEET & INDEX

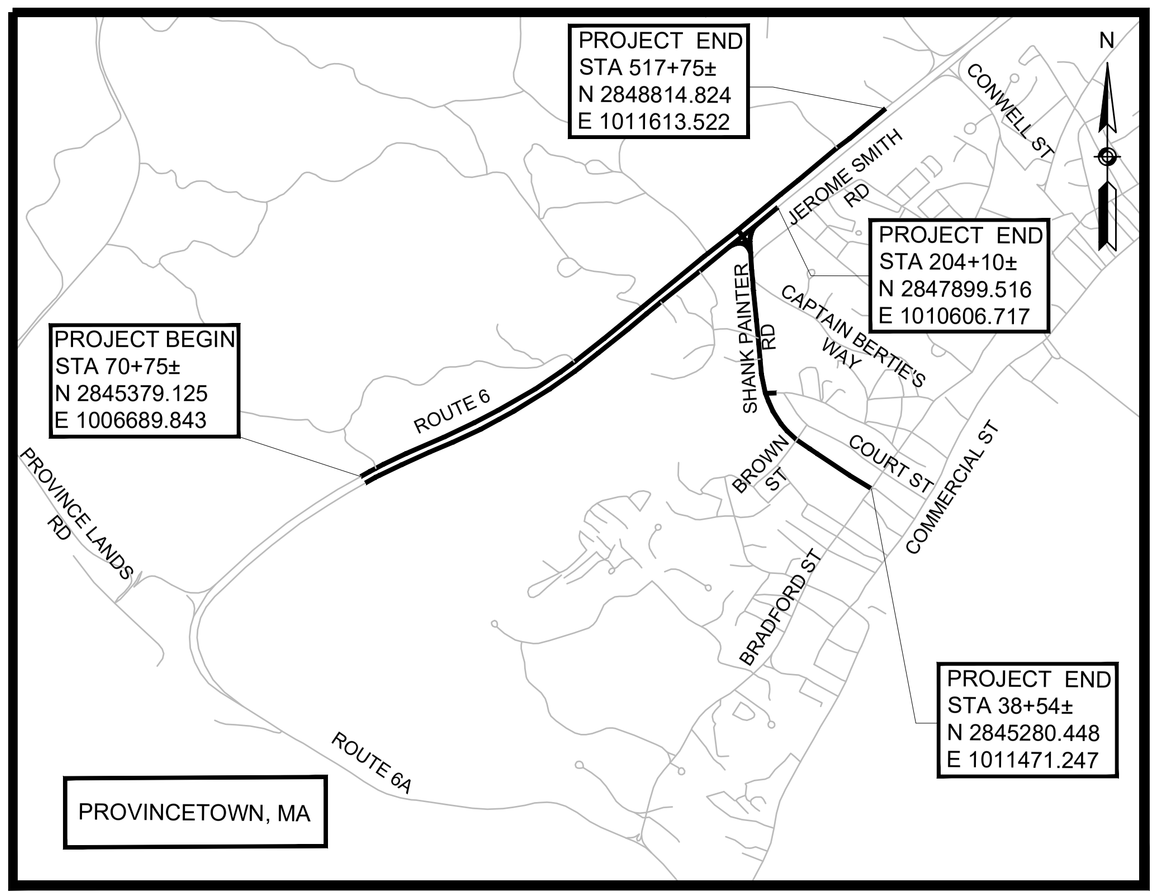
608744_HD(TITLE).DWG Plotted on 2-Apr-2026 5:01 PM

Proposal No. 608744-134412

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INDEX

SHEET NO.	DESCRIPTION
001	TITLE SHEET & INDEX
002	LEGEND & ABBREVIATIONS
003	KEY PLAN & BORING LOCATIONS
004-006	GENERAL NOTES & BORING LOGS
007-010	TYPICAL SECTIONS
011-023	SURVEY CONTROL PLANS - ROUTE 6
024-029	SURVEY CONTROL PLANS - SHANK PAINTER ROAD
030-042	CONSTRUCTION PLANS - ROUTE 6
043-048	CONSTRUCTION PLANS - SHANK PAINTER ROAD
049-055	PROFILE - ROUTE 6
056-061	PROFILE - ROUTE 6 - PEDESTRIAN AND BIKE PATH
062-067	PROFILE - SHANK PAINTER ROAD
068-070	PROFILES - SIDE STREETS
071-083	CURB TIE PLANS - ROUTE 6
084-089	CURB TIE PLANS - SHANK PAINTER ROAD
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109-116	TRAFFIC SIGN & PAVEMENT MARKING PLANS - ROUTE 6
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120-121	TRAFFIC SIGN SUMMARY
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179-211	CROSS SECTIONS - ROUTE 6 COMBINED
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244-246	CROSS SECTIONS - ROUTE 6 EASTBOUND
247-249	CROSS SECTIONS - ROUTE 6 WESTBOUND
250-255	CROSS SECTIONS - ROUNDABOUT
256-279	CROSS SECTIONS - SHANK PAINTER ROAD
280	CROSS SECTIONS - COURT STREET



0 1000 2000 3000 4000

SCALE: 1" = 1000'

LENGTH OF PROJECT
ROUTE 6 = 5998± FEET = 1.13 MILES
SHANK PAINTER ROAD = 2925± FEET = 0.55 MILES

THESE PLANS ARE SUPPLEMENTED BY THE LATEST EDITIONS OF THE FOLLOWING PUBLICATIONS, AS IDENTIFIED IN THE CONTRACT SPECIAL PROVISIONS: THE MASSDOT CONSTRUCTION STANDARD DETAILS, THE MASSDOT STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE MASSDOT STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, THE MASSDOT OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, THE MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, AND THE ANSI AMERICAN STANDARD FOR NURSERY STOCK.

DESIGN DESIGNATION	SHANK PAINTER ROAD	ROUTE 6
DESIGN SPEED	30 MPH	45 MPH
ADT (2019)	8,889	11,340
ADT (2029)	9,343	11,920
K	8.1%	8.0%
D	55% NB	55% EB
T (PEAK HOUR)	2.6%	2.0%
T (AVERAGE DAY)	1.8%	1.0%
DHV	760	956
DDHV	415	525
FUNCTIONAL CLASSIFICATION	URBAN MINOR ARTERIAL	URBAN PRINCIPAL ARTERIAL

DATE	DESCRIPTION	REV #

massDOT
Massachusetts Department of Transportation
Highway Division

APPROVED

CHIEF ENGINEER _____ DATE _____

APEX.
APEX COMPANIES, LLC
1900 CROWN COLONY DR.
SUITE 402,
QUINCY, MA 02169

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
x		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		SEDIMENT CONTROL BARRIER
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
℄		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE
	CW	CROSSWALK (SEE P. 163 FOR DETAIL)
	SWL	SOLID WHITE LINE
	SYL	SOLID YELLOW LINE
	BWL	BROKEN WHITE LINE (10' LINE SEGMENT WITH 30' GAPS)
	BYL	BROKEN YELLOW LINE (10' LINE SEGMENT WITH 30' GAPS)
	DWL	DOTTED WHITE LINE (3' LINE SEGMENT WITH 9' GAPS)
	DYL	DOTTED YELLOW LINE (3' LINE SEGMENT WITH 9' GAPS)
	DWLEx	DOTTED WHITE LINE EXTENSION (2' LINE SEGMENT WITH 6' GAPS)
	DYLEx	DOTTED YELLOW LINE EXTENSION (2' LINE SEGMENT WITH 6' GAPS)
	DWREL	12" WIDE DOTTED WHITE ROUNDABOUT ENTRY LINE (2' LINE SEGMENT WITH 2' GAPS)
	DBWL	DOUBLE WHITE LINE
	DBYL	DOUBLE YELLOW LINE

NOTE:
EXCEPT WHERE NOTED ON THE PLANS, ALL PAVEMENT MARKINGS SHALL BE 6 INCHES WIDE. EXCEPTION APPLIES TO PAVEMENT MARKINGS WITHIN THE BICYCLE PATH, WHERE MARKINGS MAY BE 4 INCHES WIDE.

UTILITY COLOR GUIDE

UTILITY	LINE COLOR	EXISTING	PROPOSED
ELECTRIC	RED		
GAS-OIL-STEAM	BROWN		
COMMUNICATION / CATV	ORANGE		
POTABLE WATER	BLUE		
SEWER	GREEN		
DRAINAGE	TRADITIONAL GRAYSCALE		

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CHANNEL
BCR	BICYCLE CURB RAMP
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
NS	WILDFIRE BLACK TUPELO
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCR	PEDESTRIAN CURB RAMP
PE	PRINCETON ELM
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PM	PAVEMENT MARKING
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY

ABBREVIATIONS (cont.)

GENERAL

PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY
QA	WHITE OAK
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TOW	TOP OF WATER
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL ABBREVIATIONS

CAB	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY UPRAISED HAND
FDW	FLASHING UPRAISED HAND
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR YELLOW
FYL	FLASHING YELLOW LEFT ARROW
FYR	FLASHING YELLOW RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILT, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALKING PERSON
Y	STEADY CIRCULAR YELLOW
YL	STEADY YELLOW LEFT ARROW

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	002	280
PROJECT FILE NO.	608744		

LEGEND & ABBREVIATIONS

608744_HD(LEGEND).DWG Plotted on 21-Apr-2026 5:33 PM
Proposal No. 608744-136412
A008834 - 29

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

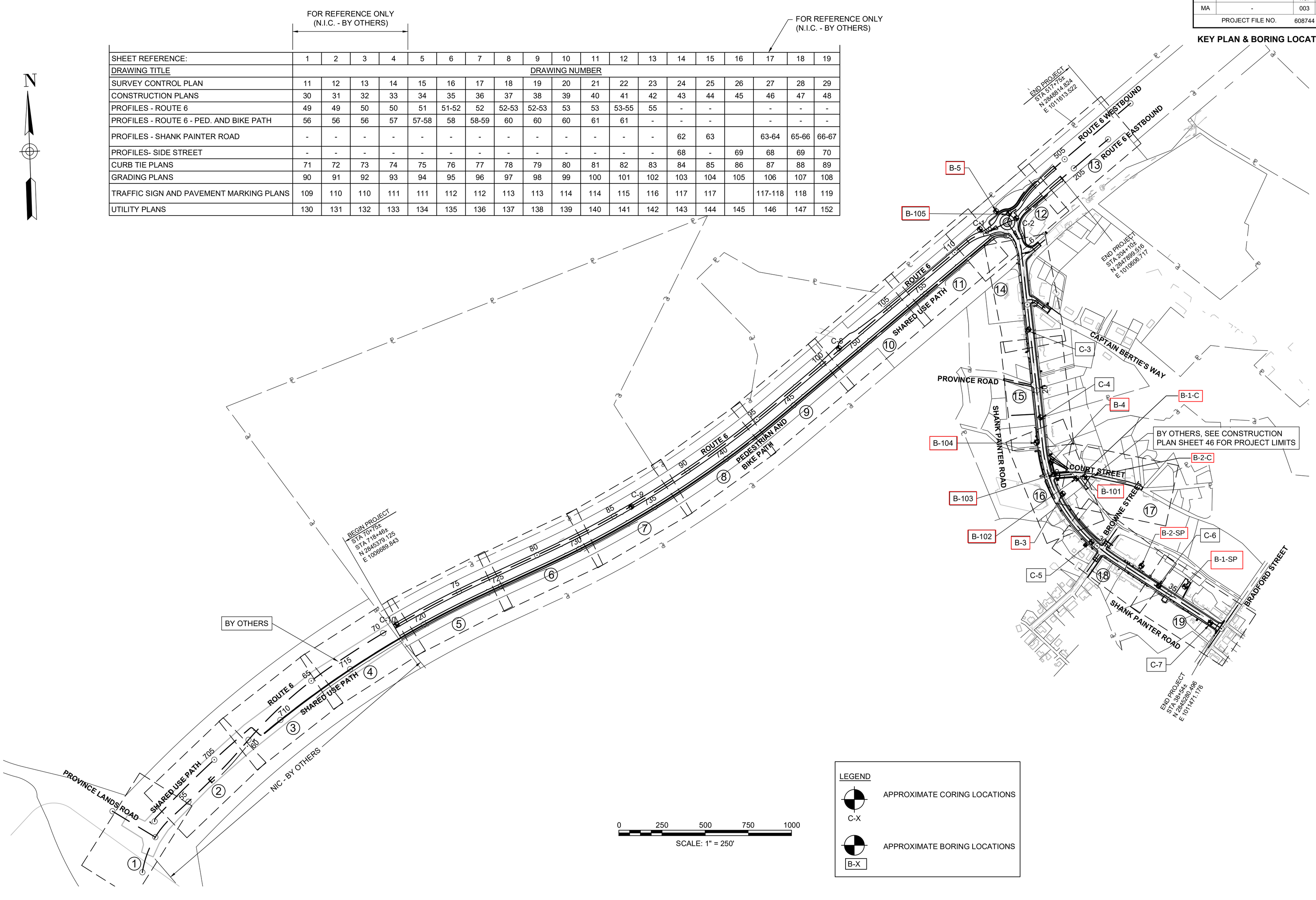
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	003	280
PROJECT FILE NO.	608744		

KEY PLAN & BORING LOCATIONS

FOR REFERENCE ONLY (N.I.C. - BY OTHERS)

FOR REFERENCE ONLY (N.I.C. - BY OTHERS)

SHEET REFERENCE:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
DRAWING TITLE	DRAWING NUMBER																		
SURVEY CONTROL PLAN	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
CONSTRUCTION PLANS	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
PROFILES - ROUTE 6	49	49	50	50	51	51-52	52	52-53	52-53	53	53	53-55	55	-	-		-	-	-
PROFILES - ROUTE 6 - PED. AND BIKE PATH	56	56	56	57	57-58	58	58-59	60	60	60	61	61	-	-	-		-	-	-
PROFILES - SHANK PAINTER ROAD	-	-	-	-	-	-	-	-	-	-	-	-	-	62	63		63-64	65-66	66-67
PROFILES- SIDE STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	68	-	69	68	69	70
CURB TIE PLANS	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
GRADING PLANS	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
TRAFFIC SIGN AND PAVEMENT MARKING PLANS	109	110	110	111	111	112	112	113	113	114	114	115	116	117	117		117-118	118	119
UTILITY PLANS	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	152



608744_HD(KEY&BORING).DWG Plotted on 21-Apr-2026 5:34 PM

Proposal No. 608744-135412

A00834 - 30

HIGHWAY GUARD DETAILS

STA 201+80 TO 202+05 RT (GUARDRAIL TANGENT END TREATMENT, TL-2)
STA 500+62 TO 500+71 LT (TRAILING ANCHORAGE)
STA 500+71 TO 502+05 LT (GUARDRAIL, TL-3)
STA 502+05 TO 502+30 LT (GUARDRAIL TANGENT END TREATMENT, TL-3)

DRAINAGE DETAILS

SEE SHEET 141

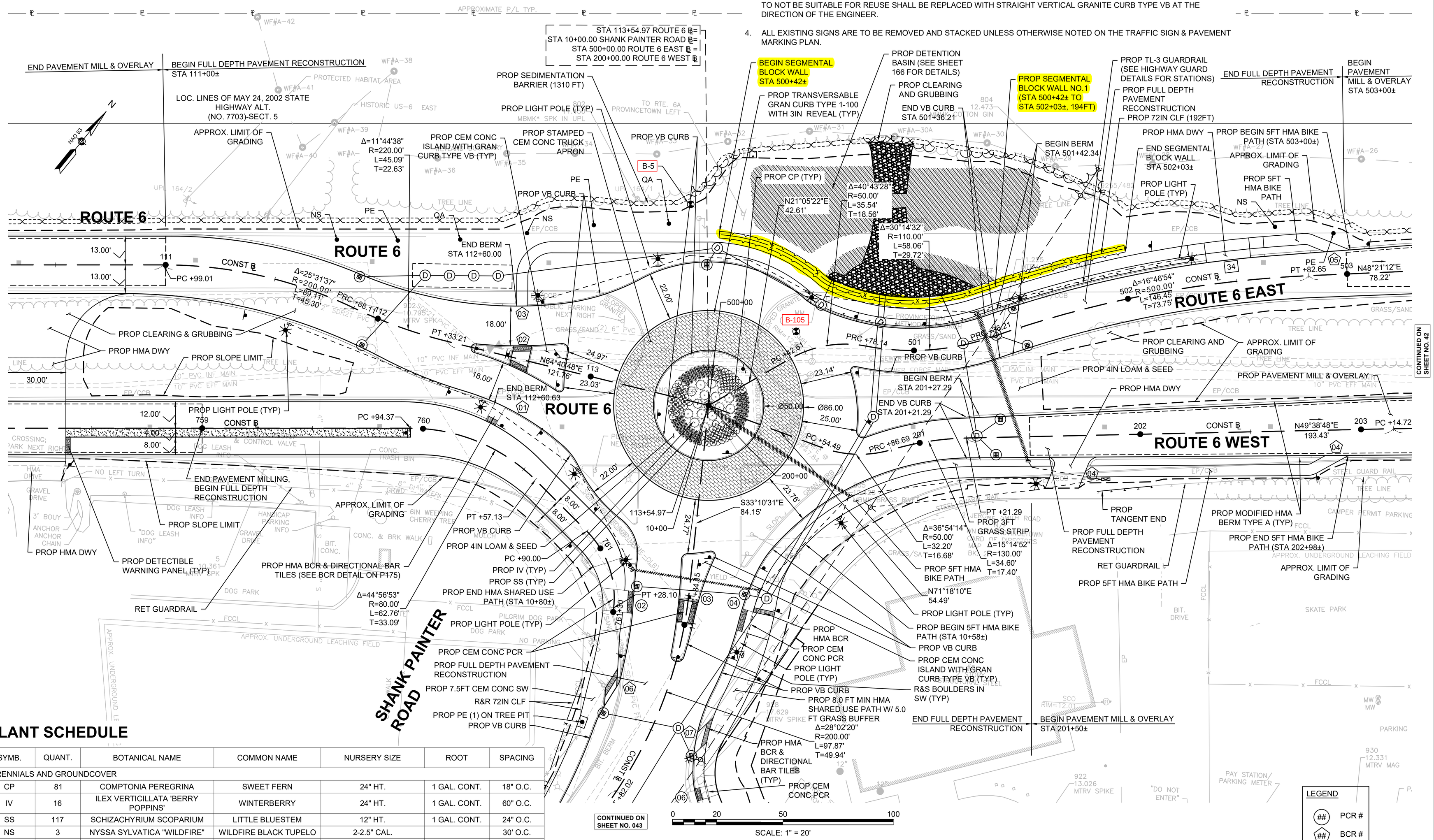
NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	041	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 12



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	ROOT	SPACING
PERENNIALS AND GROUNDCOVER						
CP	81	COMPTONIA PEREGRINA	SWEET FERN	24" HT.	1 GAL. CONT.	18" O.C.
IV	16	ILEX VERTICILLATA 'BERRY POPPINS'	WINTERBERRY	24" HT.	1 GAL. CONT.	60" O.C.
SS	117	SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	12" HT.	1 GAL. CONT.	24" O.C.
NS	3	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL.		30' O.C.
PE	3	ULMUS AMERICANA	PRINCETON ELM	2-2.5" CAL.		30' O.C.
QA	2	QUERCUS ALBA	WHITE OAK	2-2.5" CAL.		30' O.C.

608744_HD(CP_RTE6).DWG Plotted on 21-Apr-2026 5:35 PM
Proposal No. 608744-136412
A00834 - 31

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 143 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 143

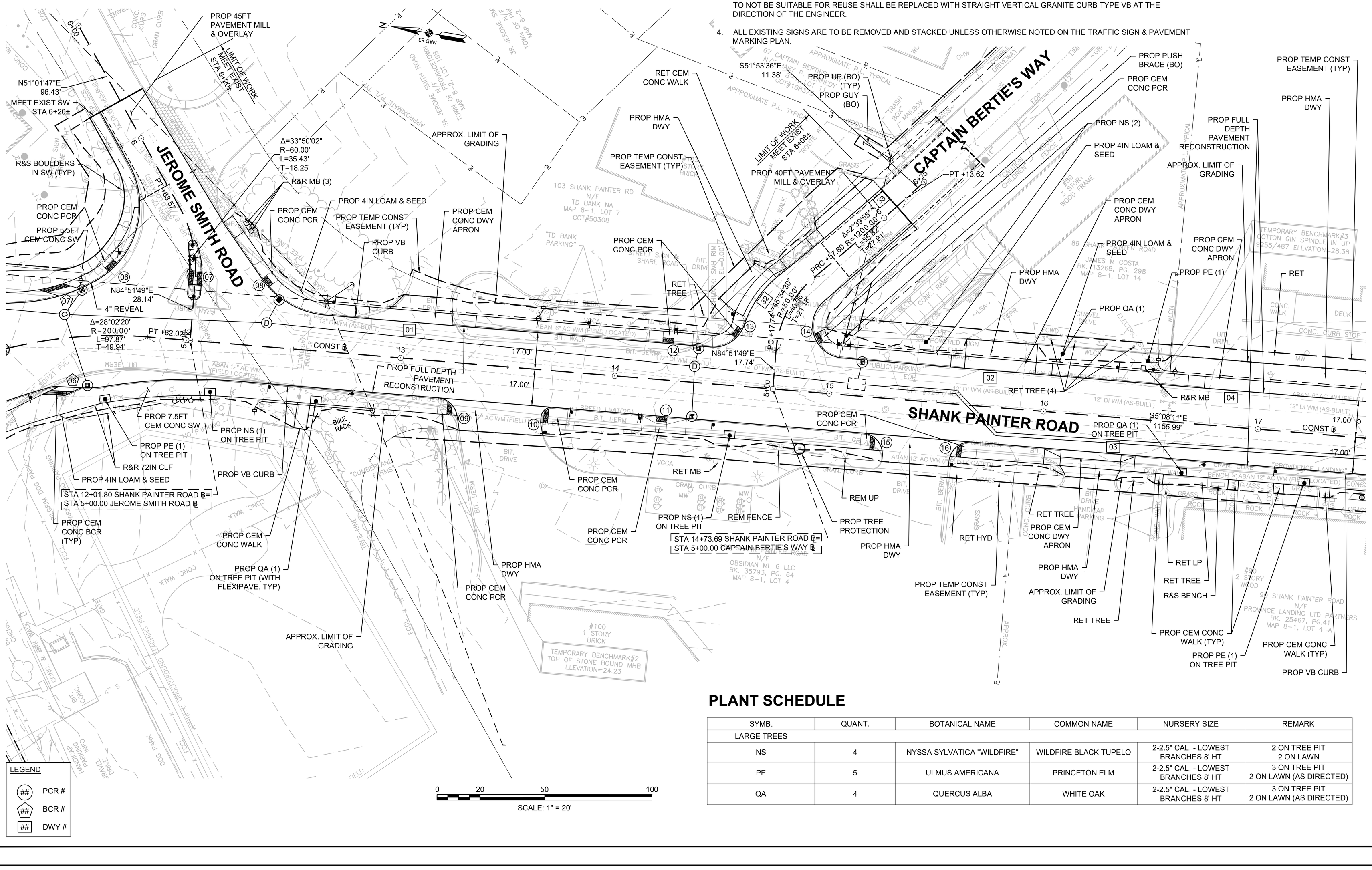
NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	043	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 14



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	4	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT 2 ON LAWN
PE	5	ULMUS AMERICANA	PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	3 ON TREE PIT 2 ON LAWN (AS DIRECTED)
QA	4	QUERCUS ALBA	WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	3 ON TREE PIT 2 ON LAWN (AS DIRECTED)

608744_HD(CP_SHANK).DWG Plotted on 21-Apr-2026 5:40 PM
Proposal No. 608744-1-1-1-1-2
A00834 - 32

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	044	280
PROJECT FILE NO.			

CONSTRUCTION PLANS - 15

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

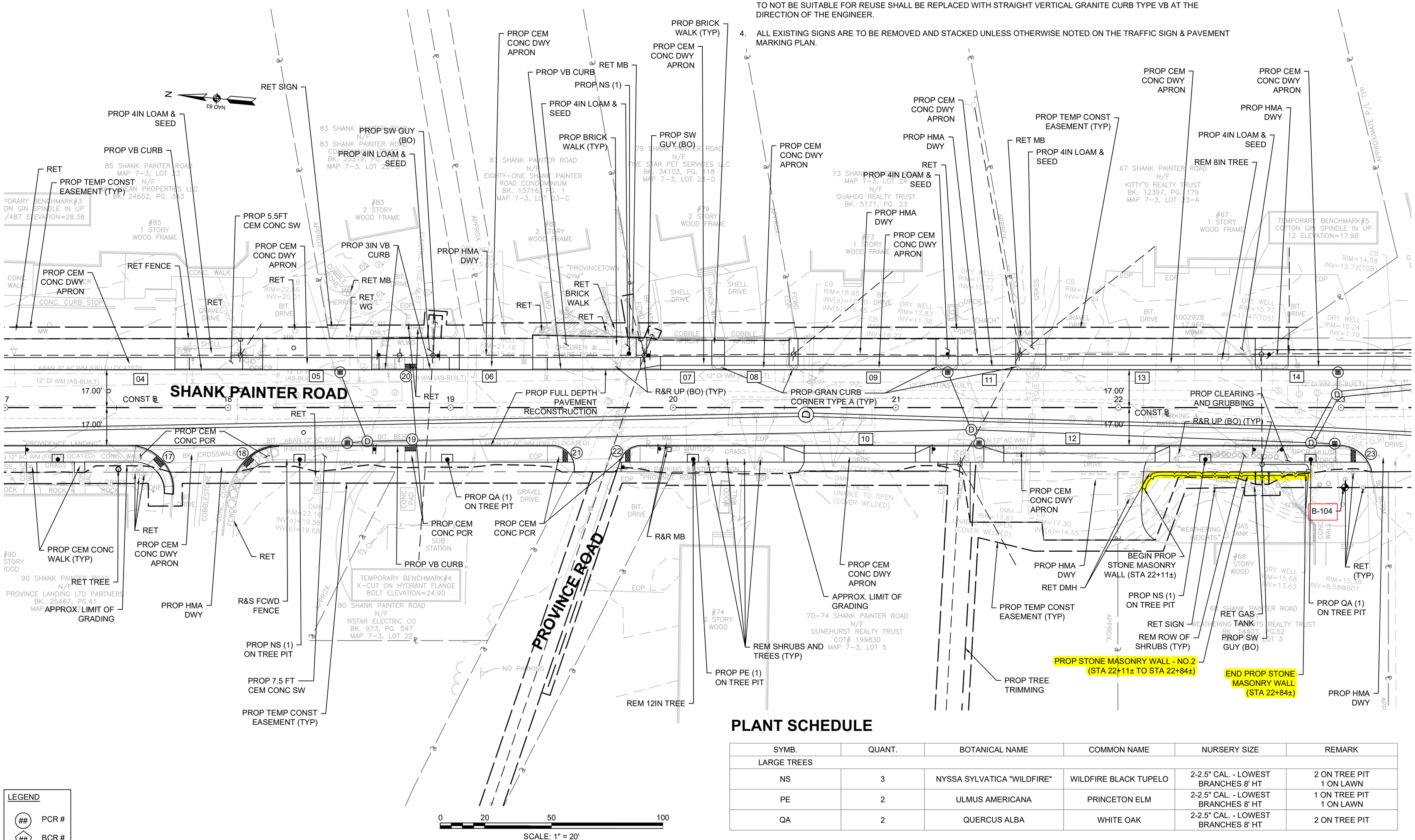
SEE SHEET 144 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 144

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



LEGEND

- (##) PCR #
- ##◇ BCR #
- [##] DWY #

PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	3	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT 1 ON LAWN
PE	2	ULMUS AMERICANA	PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
QA	2	QUERCUS ALBA	WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT

608744_HD(CP_SHANK).DWG Plotted on 21-Apr-2026 5:40 PM
Proposal No. 608744-136412
A00834 - 33

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	045	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 16

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

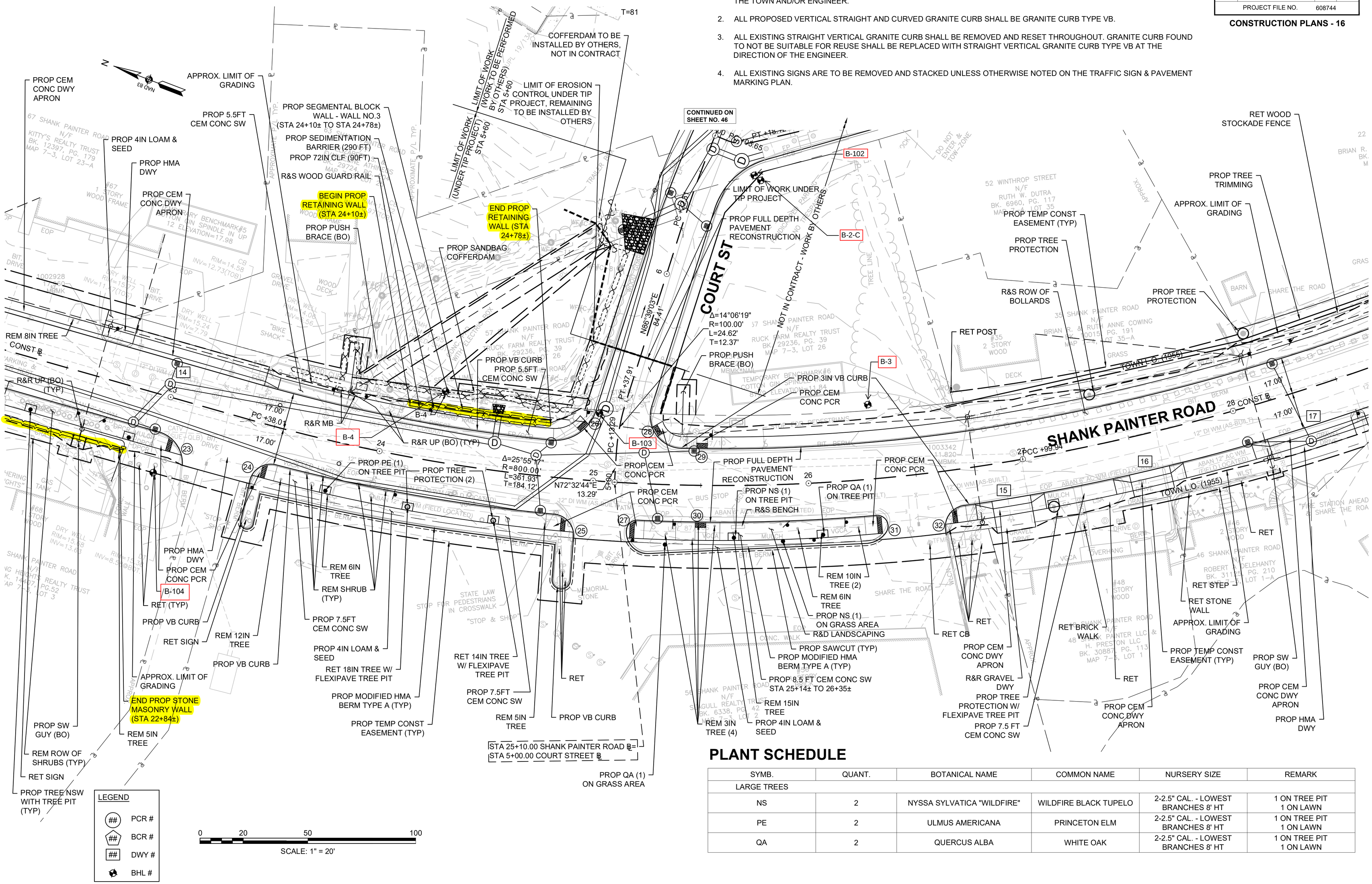
SEE SHEET 145 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 145

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	2	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
PE	2	ULMUS AMERICANA	PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
QA	2	QUERCUS ALBA	WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN

608744_HD(CP_SHANK).DWG Plotted on 21-Apr-2026 5:40 PM
Proposal No. 608744-11612
A00834 - 34

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	046	280
PROJECT FILE NO.			

CONSTRUCTION PLANS - 17

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 146 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 146

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.

CONTINUED ON SHEET NO. 045

END PROP STONE MASONRY WALL (STA 22+84±)
APPROX. LIMIT OF GRADING
B-104
PROP CEM CONC PCR
RET (TYP)
PROP HMA DWY
PROP VB CURB
RET SIGN
REM 12IN TREE
PROP VB CURB
PROP 7.5FT CEM CONC SW
REM SHRUB (TYP)
PROP 4IN LOAM & SEED
RET 18IN TREE W/ FLEXIPAVE TREE PIT
PROP MODIFIED HMA BERM TYPE A (TYP)
PROP TEMP CONST EASEMENT (TYP)
RET 14IN TREE W/ FLEXIPAVE TREE PIT
PROP 7.5FT CEM CONC SW
REM 5IN TREE
RET
PROP VB CURB
PROP HMA DWY
STA 25+10.00 SHANK PAINTER ROAD ℄= STA 5+00.00 COURT STREET ℄
PROP CEM CONC PCR
PROP QA ON GRASS AREA
REM 3IN TREE (4)
PROP 4IN LOAM & SEED
PROP NS ON TREE PIT
REM 15IN TREE
PROP MODIFIED HMA BERM TYPE A (TYP)
PROP SAWCUT (TYP)
PROP PE ON TREE PIT (W/ FLEXIPAVE, TYP)
PROP 5.5FT CEM CONC SW
APPROX. LIMIT OF GRADING
PROP PUSH BRACE (BO)
R&R UP (BO) (TYP)
R&R MB
PROP SANDBAG COFFERDAM
PROP VB CURB
B-4
B-103
PROP PUSH BRACE (BO)
PROP 3IN VB CURB
PROP CEM CONC PCR
PROP FULL DEPTH PAVEMENT RECONSTRUCTION
B-3
PROP TREE NSW WITH TREE PIT (TYP)
REM 10IN TREE (2)
REM 6IN TREE
PROP CEM CONC DWY APRON
PROP QA ON TREE PIT
PC +38.01
PC +13.29
PT +37.91
N72°32'44"E 13.29'
N86°39'03"E 84.41'
Δ=14°06'19" R=100.00' L=24.62' T=12.37'
Δ=90°00'00" R=30.00' L=47.12'
Δ=90°55'17" R=300.00' L=475.96'
PC +84.81
PT +84.37
PC +53.09
PT +18.12
S76°28'01"E 168.72'
Δ=16°52'56" R=550.00' L=162.06' T=81.62'
Δ=15°05'41" R=370.00' L=97.48' T=49.02'
PC +50.57
PT +50.70
S61°22'20"E 19.43'
STA 6+68.00 COURT STREET ℄= STA 5+00.00 WINTHROP STREET ℄
BEGIN PROP SEGMENTAL BLOCK RETAINING WALL (STA 24+10±)
PROP 72IN CLF (90FT)
PROP SEDIMENTATION BARRIER (290 FT)
PROP 5.5FT CEM CONC SW
END PROP SEGMENTAL BLOCK WALL (STA 24+78±)
LIMIT OF EROSION CONTROL UNDER TIP PROJECT, REMAINING TO BE INSTALLED BY OTHERS
CONNECTION WITH COURT STREET PUMP STATION (BO)
LIMIT OF WORK UNDER TIP PROJECT
B-102
B-2-C
B-101
B-1-C
LIMIT OF WORK (UNDER TIP PROJECT) STA 5+60
LIMIT OF WORK (WORK TO BE PERFORMED BY OTHERS) STA 5+60±
COFFERDAM TO BE INSTALLED BY OTHERS, NOT IN CONTRACT
NOT IN CONTRACT - WORK BY OTHERS
SHANK PAINTER ROAD
COURT STREET
WINTHROP STREET
63 SHANK PAINTER ROAD N/F ELIZABETH S. & EVANGELINE ATHINEOS BK. 29724, PG. 204 MAP 7-3, LOT 25
45A COURT ST LLC N/F BK. 29936, PG. 189 MAP 7-4, LOT 35
45 COURT STREET N/F BWELL HOLDINGS, INC. BK. 33317, PG. 105 MAP 7-4, LOT 36-A
43 COURT STREET N/F JAMES W. SILVA BK. 33269, PG. 278 MAP 7-4, LOT 38
41 COURT STREET N/F JAMES W. SILVA BK. 33269, PG. MAP 7-4, LOT
52 WINTHROP STREET N/F RUTH W. DUTRA BK. 6956, PG. 117 MAP 7-4, LOT 35
43 WINTHROP STREET N/F TOWN OF PROVINCETOWN CEMETERY COMMISION MAP 7-4, LOT 33
#45 STORAGE GARAGE
#38
#56 STORE
#35 2 STORY WOOD
WOOD WALKWAY
WOOD PATIO
WOOD STOCKADE FENCE
CONC. PAD
BOLLARD
SHELL DRIVE
GRAVEL DRIVE
POST & RAIL FENCE
GRAN. BENCH (TYP. OF 2)
STEEL GUARDRAIL W/ GRAN. POSTS
DIRT WALKWAY
CEMETERY
STONE WALL
TRASH BOX
BRICK STAIRS
WOOD FENCE
BIT. DRIVE
BIT. APRON
GRAVEL DRIVE
CAUTION CHILDREN
TREE LINE
UPL 19/13
UPL 20/11
12940 7.488 MRMK*NAIL
12933342 520 MRMK
TEMPORARY BENCHMARK #6 COTTON GIN SPINDLE IN UP ELEVATION=11.84
BENCHMARK #5 ELEVATION=17.98
DRY WELL RIM=15.24 INV=7.79
DRY WELL RIM=14.58 INV=12.73(TOB)
DRY WELL RIM=13.72 INV=10.97(TOB)
CB RIM=13.72 INV=10.97(TOB)
CB RIM=14.58 INV=12.73(TOB)
CONTINUED ABOVE
CONTINUED BELOW
CONTINUED ON SHEET NO. 47

LEGEND

(##) PCR #
⟨##⟩ BCR #
[##] DWY #

0 20 50 100
SCALE: 1" = 20'

608744_HD(CP_SHANK).DWG Plotted on 21-Apr-2026 5:40 PM
Proposal No. 608744-136412
A00834 - 35

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	047	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 18

HIGHWAY GUARD DETAILS

STA 32+83 TO 32+92 LT (TRAILING ANCHORAGE)
STA 32+92 TO 34+05 LT (GUARDRAIL, TL-2 SINGLE FACED. DEEP POST)
STA 34+05 TO 34+30 LT (GUARDRAIL TANGENT END TREATMENT, TL-2)

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

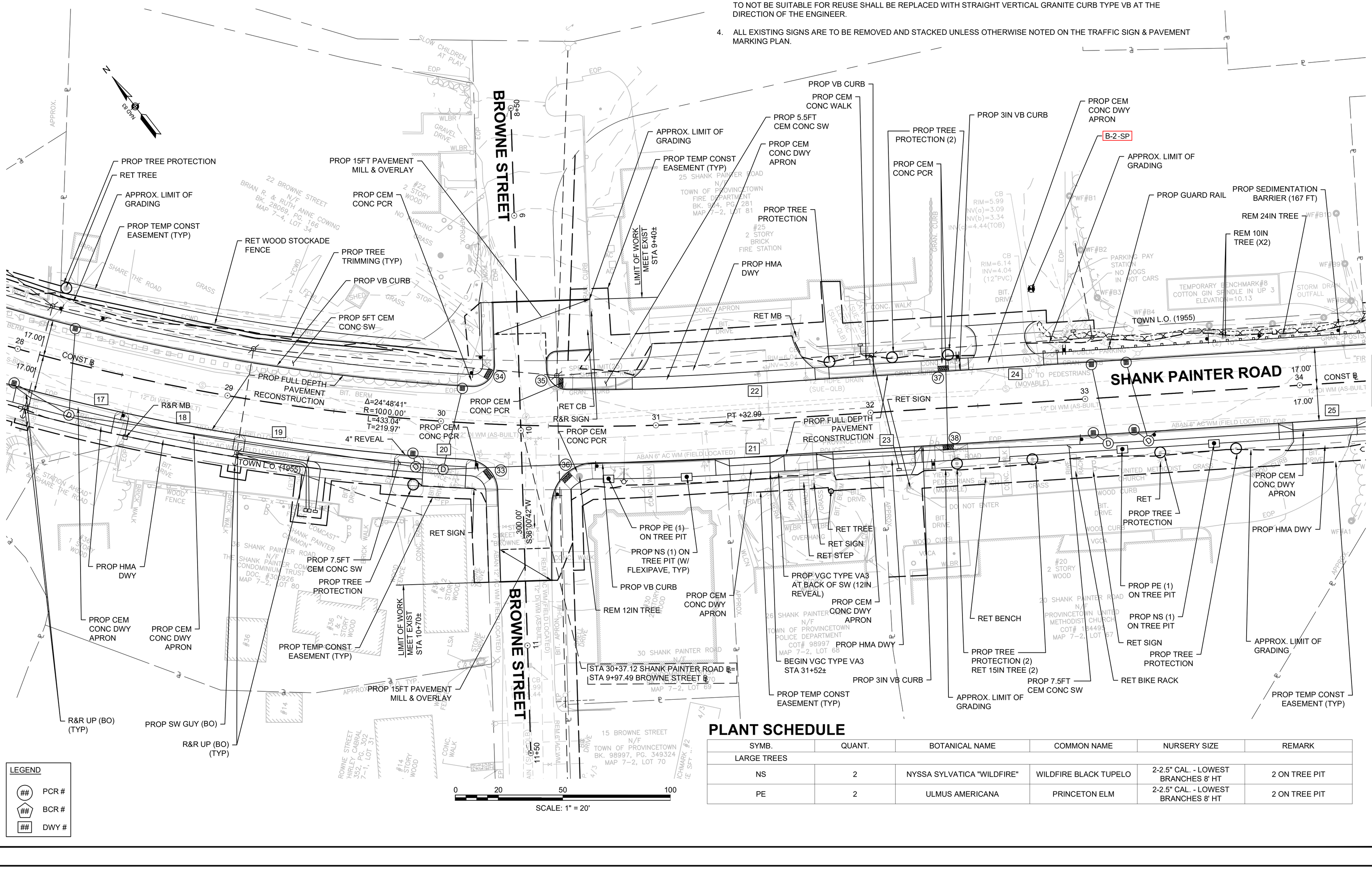
SEE SHEET 147 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 147

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
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4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



LEGEND

(##) PCR #
⟨##⟩ BCR #
[##] DWY #

PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	2	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT
PE	2	ULMUS AMERICANA	PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT

608744_HD(CP_SHANK).DWG Plotted on 21-Apr-2026 5:41 PM
Proposal No. 608744-1-19412
A00934-36

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	048	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 19

608744_HD(CP_SHANK).DWG Plotted on 21-Apr-2026 5:41 PM

Proposal No. 608744-136412

A00834 - 37

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

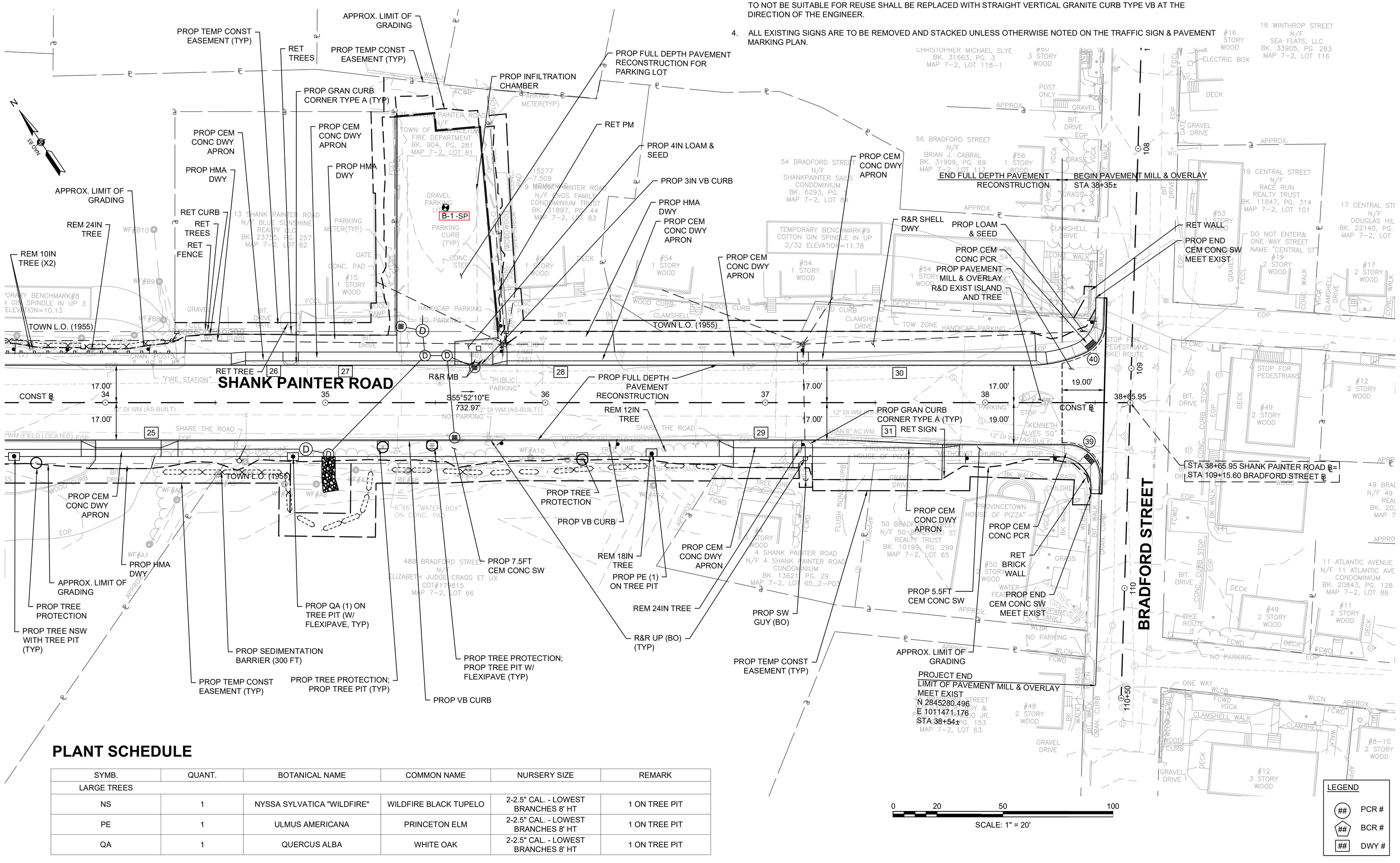
SEE SHEET 148 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 148

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	1	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT
PE	1	ULMUS AMERICANA	PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT
QA	1	QUERCUS ALBA	WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT

ATTACHMENT E

BORING LOGS

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-1-C**
Location: See Plan
Approx. Ground Elev: 5.85'
Approx. Groundwater Elev: 2.85'
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	S1	5 4 2 3	24/19	Black roadway fill	Fill	1
2				Brown, fine SAND, dry		
3					Fine SAND	
4						
5						
6	S2	6 3 3 1	24/11	Brown, medium SAND, wet	Medium SAND	
7						
8						
9						
10						
11	S3	6 6 7 10	24/7	No recovery in 2" split spoon, used 3" spoon		
12				Tan, medium SAND, wet		
13						
14						
15						
16	S4	3 35 90 88	24/0	No recovery in 2" or 3" split spoons		
17						
18						
19						
20						

NOTES:

1 Groundwater measured at 3' below ground in augers.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-1-C**
Location: See Plan
Approx. Ground Elev: 5.85'
Approx. Groundwater Elev: 2.85'
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
21	S5	8 15 49 90	24/24	Brown, medium to coarse SAND with trace gravel, wet	Medium SAND	
22						
23					Coarse SAND	
24						
25						
26	S6	6 12 20 24	24/12	Brown, coarse SAND and gravel, wet		
27						

Boring terminated at predetermined depth of 27' below grade

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-2-C**
Location: See Plan
Approx. Ground Elev: 6.59'
Approx. Groundwater Elev: 3.59'
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	S1	7 11 9 11	24/24	Brown, fine to medium SAND, dry	Fine SAND	
2						
3						1
4						
5						
6	S2	4 2 2 2	24/16	Brown, medium SAND, wet		
7						
8						
9						
10						
11	S3	1 2 2 3	24/8	No recovery in 2" split spoon, used 3" spoon Brown, medium SAND, wet	Medium SAND	
12						
13						
14						
15						
16	S4	1 2 6 8	24/0	No recovery in 2" or 3" split spoons		
17						
18						
19						
20						

NOTES:

1 Groundwater measured at 3' below ground in augers.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-2-C**
Location: See Plan
Approx. Ground Elev: 6.59'
Approx. Groundwater Elev: 3.59'
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
21	S5	4 8 14 20	24/14	Tan, medium SAND, wet Tan, coarse SAND with gravel, wet	Medium SAND	
22						
23					Medium to Coarse SAND	
24						
25						
26	S6	10 14 17 21	24/17	Tan, medium to coarse SAND with trace gravel, wet		
27						

Boring terminated at predetermined depth of 27' below grade

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 79F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-1-SP
Location: Gravel Lot near #15 SP Rd.
Approx. Ground Elev: 7.20'
Approx. Groundwater Elev: 2.07'
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1						
2	Skipped					1
3						
4						
5	S-1	9 7 3 5	24/7	3" Wood 4" Coarse Sand with Trace Gravel, Wet	Wood Coarse Sand with Trace Gravel	2
6						
7						
8						
9						
10	S-2	6 5 3 3	24/24	18" Coarse Sand 3" Wood 3" Medium Gravel and Sand, Wet	Coarse Sand Wood Medium Gravel and Sand	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Wood from around 1.5'-3' below grade.
2. Approximate GW elev. = 5.13' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 80F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-2-SP
Location: Parking Lot Near Fire Station
Approx. Ground Elev: 6.30'
Approx. Groundwater Elev: 0.05'
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1						
2	Skipped					
3						
4						
5	S-1	6 5 7 7	24/17	5" Sand with Some Medium Gravel 12" Coarse Sand, Dry	Sand with Some Med. Gravel Coarse Sand	1
6						
7						
8						
9						
10	S-2	5 5 5 4	24/21	21" Coarse Sand with Trace Gravel, Wet	Coarse Sand with Trace Gravel	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 6.25' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-3
Location: SP Rd and Court St Intersection
Approx. Ground Elev: 10.15'
Approx. Groundwater Elev: -0.05" bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1						
2	Skipped					
3						
4						
5	S-1	10 4	24/17	2" Asphalt/Pavement	Asphalt/Pavement	
6		10 18		15" Coarse Sand, Dry	Coarse Sand	
7						
8						
9						
10	S-2	18 9	24/21	2" Coarse Sand with Little Gravel	Coarse Sand with Little Gravel	1
11		9 7		19" Coarse Sand, Wet	Coarse Sand	
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 10.2' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-4
Location: SP Rd and Court St Intersection
Approx. Ground Elev: 13.94'
Approx. Groundwater Elev: 3.24'
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1						
2	Skipped					
3						
4						
5	S-1	5 2 7 14	24/19	19" Coarse Sand, Dry	Coarse Sand	
6						
7						
8						
9						
10	S-2	6 7 10 12	24/20	2" Sand with Some Medium Gravel 18" Coarse Sand, Wet	Sand with Some Med. Gravel Coarse Sand	1
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 10.7' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-5
Location: SP Rd and Rt. 6 Interseciton
Approx. Ground Elev: 12.06'
Approx. Groundwater Elev: 0.36'
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1						
2	Skipped					
3						
4						
5	S-1	7 10 11 13	24/21	5" Coarse Sand with Trace Silt 16" Coarse Sand, Dry	Coarse Sand with Trace Silt Coarse Sand	
6						
7						
8						
9						
10	S-2	6 10 11 9	24/21	21" Coarse Sand, Dry	Coarse Sand	
11						
12						1
13						
14						
15	S-3	8 35 47 90+	24/24	23" Coarse Sand 1" Rock, Wet	Coarse Sand Rock	2
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 11.7' below grade.
2. Approximate Bedrock elev. = 16' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

ENVIRONMENTAL PARTNERS

BORING LOG

Project:	Provincetown Shank Painter Road Flooding Geotech Investigation
Location:	Shank Painter Road and Court Street
Client:	Town of Provincetown
Driller:	Northern Drilling Services
Drilling Methods:	Drive and Wash
Rig Type:	REDI Drill
Weather:	35-55°F, Clear
Performed By:	AO Date: 4/16/2025
Checked By:	Date:

Boring No: B-101

Location:	42.050579, -70.194435
Approx. Ground Elevation:	5.81'
Approx. Groundwater Elevation:	3.28'
Date/Time of Groundwater Elevation:	4/16/2025 12:00
Datum:	NAD83 2011

Project No: SPE020-0631071-24006873

Depth (feet)	Sample No.	Blow Per 6" or 12"	Density / Consistency / Hardness	Rec./ Pen.	Soil Description	USCS Classification	Note No.
1 2	B-101 (0-2')	19 10 11 16	Medium Dense	20"/24"	0-1' Black ASPHALT. Dry, medium dense, angular. 1'-1'3" Light gray GRAVEL and rock flour. Small, angular, medium dense, dry, and well graded. 1'3"-2' Light brown fine to medium SAND. Medium dense, dry, and poorly graded	ASPHALT GW	1,2
3 4							
5 6	B-101 (4-6')	2 2 3 2	Loose	8"/24"	4-6' SAA, becomes loose and wet.		1,2
7 8 9							
10 11	B-101 (9-11')	2 3 4 5	Loose	3"/24"	9-11' Light gray fine sand, trace small rounded cobbles. Loose, wet, and poorly graded.	SP	1,2
12 13 14							
15 16	N/A	4 6 10 11	Medium Dense	5"/24"	14-16' Light brown fine to medium SAND. Medium dense, poorly graded, and wet.		1,2,3
17 18 19							
20 21	B-101 (19-21')	6 8 11 13	Medium Dense	10"/24"	19-21' Light brown medium to coarse SAND and multicolored small-med subangular gravel. Medium dense, well graded, and wet.	SW	1,2
22 23 24							
25 26	B-101 (24-26')	7 11 14 17	Medium Dense	10"/24"	24-26' SAA		
27 28 29							
30 31	B-101 (29-31')	6 12 27 31	Dense	5"/24"	29-30' Light gray coarse sand and small to medium round to subangular cobbles. Dense, wet, and well graded. 30-31' Light gray fine to medium sand. Poorly graded, wet, and dense.		1,2
32 33 34						SP	
35 36	B-101 (34-36')	7 17 20 25	Dense	3"/24"	34-36' SAA		1,2
37 38 39							
40 41	N/A	6 8 8 14	Medium Dense	10"/24"	39-41' No recovery in spoon, unable to collect any material. Blow counts indicate material is medium dense..		1,2,3
42 43 44						No Sample	
45 46	N/A	10 20 26 46	Dense		44-46' No recovery in spoon, unable to collect any material. Blow counts indicate material is dense.		1,2,3

Target Depth Reached at 46 Feet BGS

NOTES:

1. No sheen, odor, or staining identified in sample
2. Split Spoon Sample
3. No recovery, two split spoon attempts

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	SAA - Same as Above
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff

>30 Fine Soil N Value - Hard

APEX

BORING LOG

Project:	Provincetown Shank Painter Road Flooding Geotech Investigatio		**Boring No: B-102**
Location:	Shank Painter Road and Court Street		Location:42.050488, -70.194435
Client:	Town of Provincetown		Approx. Ground Elevation: 6.59'
Driller:	Northern Drilling Services		Approx. Groundwater Elevation: 3.70'
Drilling Methods:	Drive and Wash		Date/Time of Groundwater Elevation: 4/16/2025 3:00
Rig Type:	REDI Drill		Datum: NAD83 2011
Weather:	35-55°F, Clear		
Performed By:	AO Date: 4/16/2025		
Checked By:	Date:		Project No: SPE020-0631071-24006873

Depth (feet)	Sample No.	Blow Per 6" or 12"	Density / Consistency / Hardness	Rec./ Pen.	Soil Description	USCS Classification	Note No.
1 2	B-102 (0-2')	11 9 8 9	Soft Medium Dense	20"/24"	0-1' Black sandy SILT with small to medium subangular. Dry, medium dense, and soft. 1-2' Light gray fine to medium SAND. Poorly graded, medium dense, and moist.	ML	1,2
3 4							
5 6	B-102 (4-6')	1 2 2 3	Loose	5"/24"	4-6' SAA, becomes loose and wet.		1,2
7 8 9							
10 11	B-102 (9-11')	2 3 4 6	Loose	0"/24"	9-11' No recovery in spoon, collected what fell out of the spoon and the material is SAA with rouned medium gravel.	SP	1,2,3
12 13 14							
15 16	N/A	2 6 9 11	Medium Dense	2"/24"	14-16' Light gray fine sand, trace medium sand. Medium dense, wet, and well graded.		2,3
17 18 19							
20 21	B-102 (19-21')	10 14 16 14	Medium Dense	9"/24"	19-21' Light brown fine to medium SAND. Medium dense, wet, and poorly graded.		1,2
22 23 24							
25 26	B-102 (24-26')	4 13 15 16	Medium Dense	3"/24"	24-26' Gray medium to coarse SAND and small to medium subangular cobbles. Medium dense, wet, and well graded.		
27 28 29							
30 31	B-102 (29-31')	6 12 27 31	Dense	5"/24"	29-31' Gray fine to coarse SAND with small multicolored cobbles. Med dense to dense, wet, and well graded.		1,2
32 33 34						SW	
35 36	B-102 (34-36')	12 20 27 40	Dense	3"/24"	34-36' Light gray fine to coarse SAND, trace medium gravel. Medium dense to dense, wet, and well graded.		1,2
37 38 39							
40 41	B-102 (39-41')	9 21 22 25	Dense	10"/24"	39-41' Gray fine SAND. Dense, wet, and poorly graded.	SP	1,2

Target Depth Reached at 41 Feet BGS

NOTES:

1. No sheen, odor, or staining identified in sample
2. Split Spoon Sample
3. Low recovery, two split spoon attempts

Well installed at 19' bgs. Screened for 10' from 19-9' bgs using 30-slot PVC.
DTW: 2.89' fpvc DTB: 18.90' fpvc

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample	SAA - Same as Above	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

APEX

BORING LOG

Project:	Provincetown Shank Painter Road Flooding Geotech Investigation		**Boring No: B-103**
Location:	Shank Painter Road and Court Street		Location:42.050631, -70.195191
Client:	Town of Provincetown		Approx. Ground Elevation: 11.40'
Driller:	Northern Drilling Services		Approx. Groundwater Elevation: 3.28'
Drilling Methods:	Drive and Wash		Date/Time of Groundwater Elevation: 4/17/2025 12:00
Rig Type:	REDI Drill		Datum: NAD83 2011
Weather:	35-55°F, Clear		
Performed By:	AO	Date: 4/17/2025	
Checked By:		Date:	Project No: SPE020-0631071-24006873□

Depth (feet)	Sample No.	Blow Per 6" or 12"	Density / Consistency	Rec./ Pen.	Soil Description	USCS Classification	Note No.
1 2	B-102 (0-2')	4 7 9 10	Loose Medium Dense	20"/24"	0-1' Black ASPHALT. Dry, loose, angular, and poorly graded. 1"-2' Light brown fine SAND. Medium Dense, dry, and poorly graded.	ASPHALT	1,2
3 4	B-103 (2-4')	8 3 5 2	Loose	7"/24"	2-4' SAA, becomes loose.		
5 6	B-103 (4-6')	12 13 17 20		8"/24"	4-6' SAA, becomes medium dense.		1,2
7 8	B-103 (6-8')	8 9 11 10	Medium Dense	19"/24"	6-8' SAA.		1,2
9 10	B-103 (8-10')	9 12 17 20		18"/24"	8-9' SAA, becomes wet. 9-10' Black fine to medium sand. Wet, poorly graded, and medium dense. Black coloration, possible staining.		1,2 2
11 12	B-103 (10-12')	3 4 4 4	N/A	0"/24"	10-12' No recovery in spoon, unable to collect any material. Blow counts indicate material is loose.	SP	2,3
13 14	B-103 (12-14')	2 1 1 1	Loose	6"/24"	12-14' Light grayish brown fine sand. Wet, poorly graded, and loose.		
15 16	B-103 (14-16')	1 1 1 2		2"/24"	14-16' SAA. Low recovery, material is falling out of split spoon.		1,2
17 18	B-103 (16-18')	7 8 4 9	Medium Dense	14"/24	16-18' SAA.		1,2
19 20	B-103 (18-20')	6 10 14 19		5"/24"	18-20' SAA, becomes medium dense.		1,2
Target Depth Reached at 20 Feet BGS							
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40							

NOTES:

1. No sheen, odor, or staining identified in sample
2. Split Spoon Sample
3. No recovery, two split spoon attempts

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample	SAA - Same as Above	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

APEX

BORING LOG

Project:	Provincetown Shank Painter Road Flooding Geotech Investigation		**Boring No: B-104**
Location:	Shank Painter Road and Court Street		Location:42.05114, -70.195496
Client:	Town of Provincetown		Approx. Ground Elevation: 15.85'
Driller:	Northern Drilling Services		Approx. Groundwater Elevation: 7.49'
Drilling Methods:	Drive and Wash		Date/Time of Groundwater Elevation: 4/17/2025 12:00
Rig Type:	REDI Drill		Datum: NAD83 2011
Weather:	35-55°F, Clear		
Performed By:	AO	Date: 4/17/2025	
Checked By:		Date:	Project No: SPE020-0631071-24006873□

Depth (feet)	Sample No.	Blow Per 6" or 12"	Density / Consistency	Rec./ Pen.	Soil Description	USCS Classification	Note No.
1 2	B-102 (0-2')	2 4 4 4	Loose	18"/24"	0-1' Black ASPHALT. Dry, loose, angular, and poorly graded. 1-2' Light brown fine SAND. Loose, dry, and poorly graded.	ASPHALT	1,2
3 4	B-103 (2-4')	4 5 5 6		9"/24"	2-4' SAA, becomes brown.		
5 6	B-103 (4-6')	3 5 4 4		8"/24"	4-6' SAA, becomes light brown.		1,2
7 8	B-103 (6-8')	6 5 5 6		9"/24"	6-8' SAA.		1,2
9 10	B-103 (8-10')	4 5 7 8	Medium Dense	4"/24"	8-10' SAA, becomes wet and medium dense.		1,2
11 12	B-103 (10-12')	4 3 4 6	Medium Dense	12"/24"	10-12' SAA, some medium sand.	SP	1,2
13 14	B-103 (12-14')	2 3 4 2	Loose	3"/24"	12-14' Grayish light brown fine sand. Wet, poorly graded, and loose.		
15 16	B-103 (14-16')	5 5 6 7	Medium Dense	6"/24"	14-16' Dark brown-black fine sand. Wet, poorly graded, medium dense, some odor and staining.		2
17 18	B-103 (16-18')	6 5 5 7	Loose	24"/24	16-18' SAA, becomes loose.		2
19 20	B-103 (18-20')	4 3 4 4		1"/24"	18-20' Light gray fine sand. Wet, poorly graded, slight odor, and loose.		2
Target Depth Reached at 20 Feet BGS							
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40							

NOTES:

1. No sheen, odor, or staining identified in sample
2. Split Spoon Sample
3. No recovery, two split spoon attempts

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample	SAA - Same as Above	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

APEX

BORING LOG

Project:	Provincetown Shank Painter Road Flooding Geotech Investigatio		Boring No: **B-105**
Location:	Shank Painter Road and Court Street		Location:42.05779, -70.196014
Client:	Town of Provincetown		Approx. Ground Elevation: 13.15'
Driller:	Northern Drilling Services		Approx. Groundwater Elevation: 5.15'
Drilling Methods:	Drive and Wash		Date/Time of Groundwater Elevation: 4/19/2025 12:00
Rig Type:	REDI Drill		Datum: NAD83 2011
Weather:	35-55°F, Clear		
Performed By:	AO Date: 4/18/2025		
Checked By:	Date:		Project No: SPE020-0631071-24006873

Depth (feet)	Sample No.	Blow Per 6" or 12"	Density / Consistency	Rec./ Pen.	Soil Description	USCS Classification	Note No.
1 2	B-102 (0-2')	1 2 2 1	Soft	18"/24"	0-1' Black Silty LOAM top soil. Trace organics. Moist, loose, soft. 1-2' Light brown fine sand. Moist, loose, and poorly graded.	ML	1,2
3 4	B-103 (2-4')	1 3 4 12	Loose	9"/24"	2-4' SAA, @3.4' Becomes gray for 1", changes back to light brown from 3.4' to 4'		
5 6	B-103 (4-6')	8 7 8 9	Medium Dense	8"/24"	4-6' Red-brown fine sand. Moist, medium dense, and poorly graded.	SP	1,2
7 8	B-103 (6-8')	4 5 9 2		9"/24"	6-8' SAA. @7.5', color change to black for 3", then becomes light brown from 7.8' to 8'. Black coloration appears to be staining with some odor.		2
9 10	B-103 (8-10')	5 9 11 11		4"/24"	8-14' Light brown fine sand. Medium dense, wet, and poorly graded.		1,2
11 12	B-103 (10-12')	6 7 6 8		12"/24"			1,2
13 14	B-103 (12-14')	4 7 8 5		3"/24"			1,2
15 16	B-103 (14-16')	2 4 4 5	Loose	6"/24"	14-16' SAA, becomes loose.		1,2
17 18	B-103 (16-18')	6 8 8 10	Medium Dense	24"/24	16-18' SAA, becomes medium dense.		1,2
19 20	B-103 (18-20')	7 10 8 7		1"/24"	18-20' No recovery in spoon, unable to collect any material. Blow counts indicate material is medium dense.		2,3
Target Depth Reached at 20 Feet BGS							
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40							

NOTES:

1. No sheen, odor, or staining identified in sample
2. Split Spoon Sample
3. No recovery, two split spoon attempts

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers	
UT - Undisturbed Tube Sample	SAA - Same as Above	
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%	
Little - Approximately 10 to 20%	And - Approximately 35 to 50%	
0-10 Coarse Soil N Value - Loose	30-50 Coarse Soil N Value - Dense	
10-30 Coarse Soil N Value - Medium Dense	>50 Coarse Soil N Value - Very Dense	
0-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff	>30 Fine Soil N Value - Hard
4-8 Fine Soil N Value - Medium Stiff	15-30 Fine Soil N Value - Very Stiff	

APEX

ATTACHMENT F

LABORATORY ANALYSIS

Thielsch DIVISION OF THE RISE GROUP	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: Environmental Partners Woburn, MA PM: Lauren Howe Assigned By: Lauren Howe Collected By: Northern Drilling, Ltd.	Project Information: **Shank Painter Road** **Provincetown, Massachusetts** Project Number: 22007741 Summary Page: 1 of 1 Report Date: 09.19.23

LABORATORY TESTING DATA SHEET, Report No.: 7423-J-B013

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Rcvd Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	pH	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Dry unit wt. (pcf)	Test Moisture Content %	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D4792	D1557								
B-2-SP	S-1	4-6	23-S-B659				29.6	69.2	1.2											Brown poorly graded sand with gravel
B-3	S-2	9-11	23-S-B660				8.2	90.4	1.4											Brown poorly graded sand
B-5	S-2	9-11	23-S-B661				0.0	98.2	1.8											Brown poorly graded sand

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Proposal No. 608744-136412

Date Received: *09.14.23*

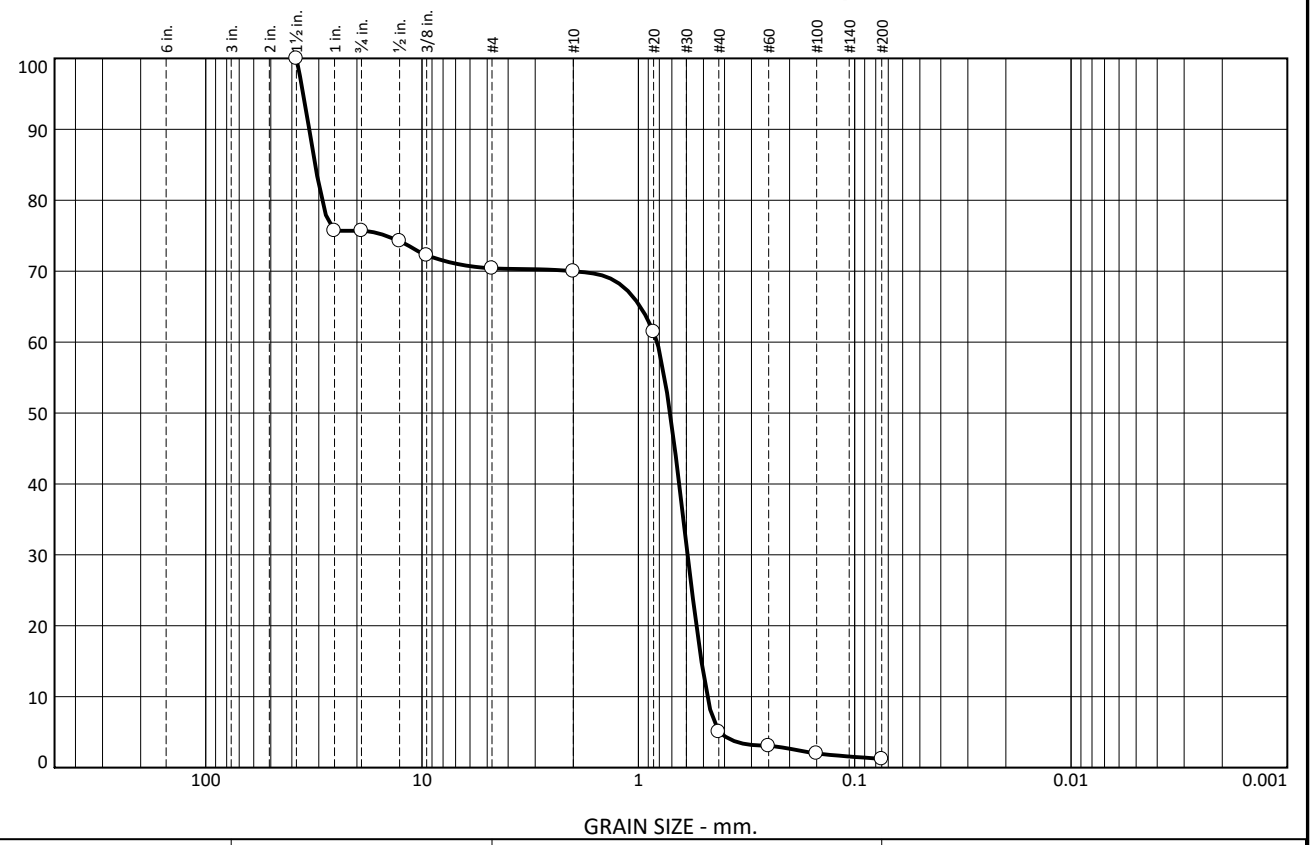
Reviewed By: Romilie LaBlanc

Date Reviewed: *09.19.23*

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	24.3	5.3	0.4	65.0	3.8	1.2	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1-1/2"	100.0		
1"	75.7		
3/4"	75.7		
1/2"	74.2		
3/8"	72.2		
#4	70.4		
#10	70.0		
#20	61.5		
#40	5.0		
#60	3.1		
#100	2.0		
#200	1.2		

* (no specification provided)

Soil Description

Brown poorly graded sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 33.2412 D_{85}= 31.1854 D_{60}= 0.8186
D_{50}= 0.7139 D_{30}= 0.5922 D_{15}= 0.5114
D_{10}= 0.4796 C_u= 1.71 C_c= 0.89

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample contains asphalt.

Source of Sample: Boring 2 Depth: 4-6'
Sample Number: 1

Date: 09.19.23

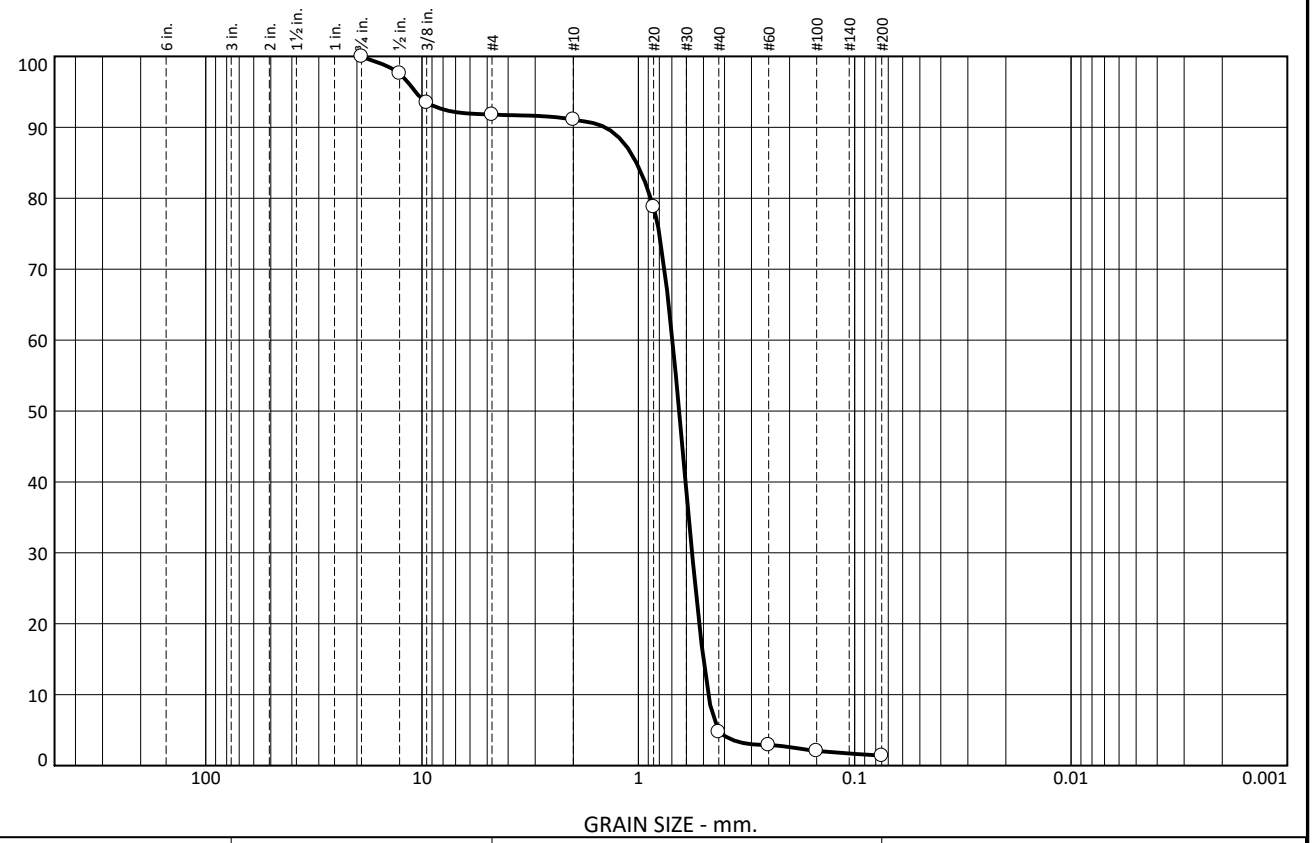
Thielsch Engineering Inc.
Cranston, RI

Client: Environmental Partners
Project: Shank Painter Road
Provincetown, MA
Project No: 22007741 Figure 23-S-B659

Tested By: AF / SF Checked By: Ronelle LeBlanc

These results are for the exclusive use of the client for whom they were obtained. This report only relates to items inspect and/or tested. No warranty, expressed or implied, is made.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.2	0.7	86.4	3.3	1.4	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	97.6		
3/8"	93.5		
#4	91.8		
#10	91.1		
#20	78.8		
#40	4.7		
#60	2.9		
#100	2.1		
#200	1.4		

* (no specification provided)

Soil Description

Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.4227 D_{85}= 1.0205 D_{60}= 0.6962
D_{50}= 0.6480 D_{30}= 0.5648 D_{15}= 0.5010
D_{10}= 0.4748 C_u= 1.47 C_c= 0.97

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample contains asphalt.

Source of Sample: Boring 3 Depth: 9-11'
Sample Number: 2

Date: 09.19.23

Thielsch Engineering Inc.

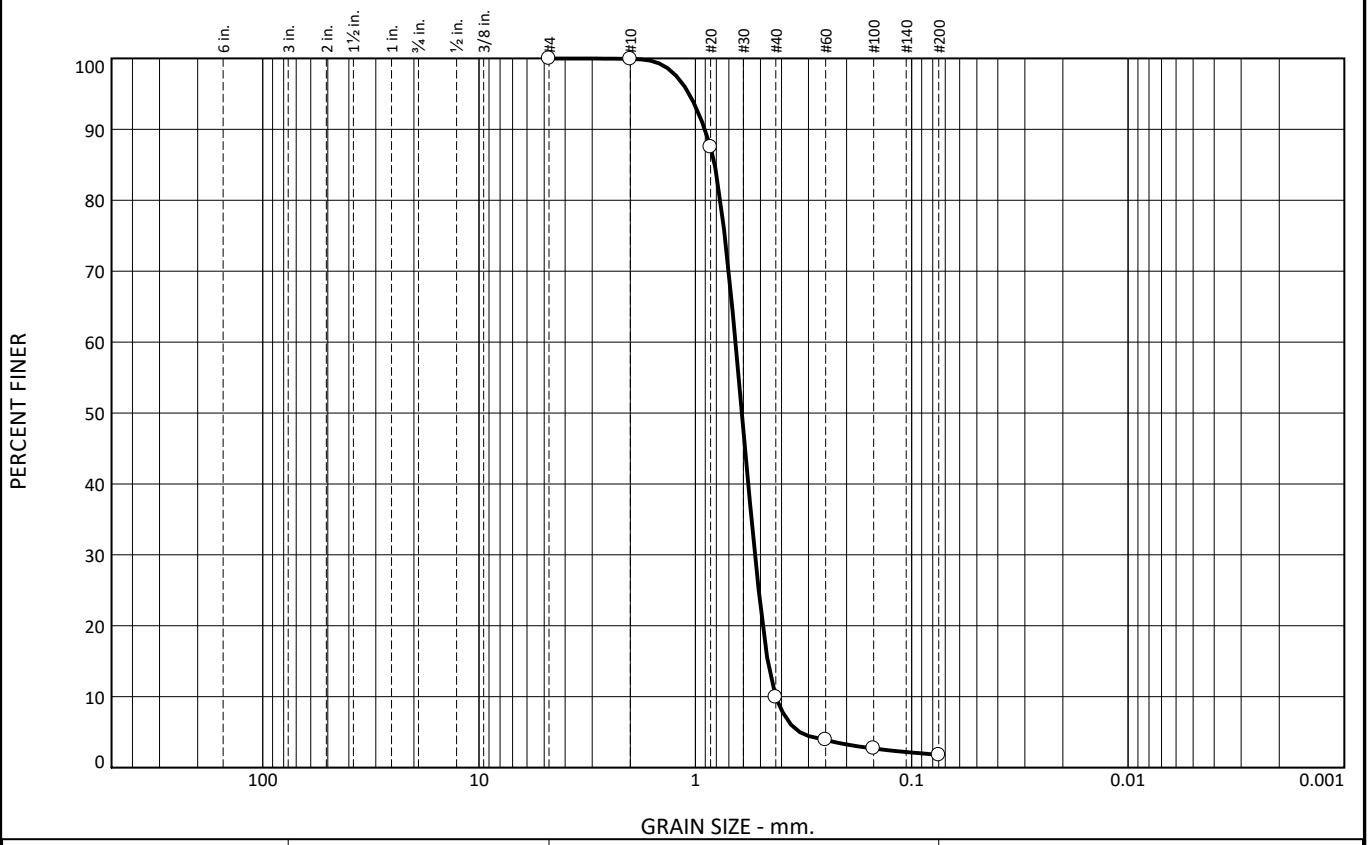
Cranston, RI

Client: Environmental Partners
Project: Shank Painter Road
Provincetown, MA
Project No: 22007741 Figure 23-S-B660

Tested By: AF / SF Checked By: Ronelle LeBlanc

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	90.0	8.1	1.8	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	87.5		
#40	9.9		
#60	3.9		
#100	2.7		
#200	1.8		

* (no specification provided)

Soil Description

Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.9044 D_{85}= 0.8131 D_{60}= 0.6526
D_{50}= 0.6097 D_{30}= 0.5304 D_{15}= 0.4631
D_{10}= 0.4261 C_u= 1.53 C_c= 1.01

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample received with standing water.

Source of Sample: Boring 5 Depth: 9-11'
Sample Number: 2

Date: 09.19.23

Thielsch Engineering Inc.

Cranston, RI

Client: Environmental Partners
Project: Shank Painter Road
Provincetown, MA
Project No: 22007741 Figure 23-S-B661

Tested By: AF / SF Checked By: Ronelle LeBlanc

Thielsch DIVISION OF THE RISE GROUP	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 cts.thielsch.com *Let's Build a Solid Foundation*	Client Information: **Apex Companies** **Quincy, MA** **617-657-0200** Project Contact: Aaron Oliver Collected By: Aaron Oliver	Project Information: **Ptown Court St. Flooding** **Quincy, MA** Project Number: R115-2005.00 Summary Page: 1 of 1 Report Date: 05.09.25

LABORATORY TESTING DATA SHEET, Report No.: 7425-E-121

Material Source	Sample ID	Depth (ft)	Laboratory No.	Identification Tests									Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Rcvd Moisture Content %	LL %	PL %	OD LL	Gravel %	Sand %	Fines %	Org. %	pH	g_d MAX (pcf) W_{opt} (%)	g_d MAX (pcf) W_{opt} (%) (Corr.)	Dry unit wt. (pcf)	Test Moisture Content %	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318			D6913			D2974	D4792	D1557								
Boring	B-101	4-6	25-S-1641					1.7	97.8	0.5											Light Brown poorly graded sand
Boring	B-101	14-16	25-S-1642					8.5	91.1	0.4											Light Brown poorly graded sand
Boring	B-101	19-21	25-S-1643					20.4	76.6	3.0											Light Brown poorly graded sand with gravel
Boring	B-102	4-6	25-S-1644					1.3	98.3	0.4											Light Grey poorly graded sand
Boring	B-102	14-16	25-S-1645					2.8	94.1	3.1											Light Grey poorly graded sand
Boring	B-102	19-21	25-S-1646					5.8	90.8	3.4											Light Brown poorly graded sand
Boring	B-103	4-6	25-S-1647					0.1	97.3	2.6											Light Brown poorly graded sand
Boring	B-104	4-6	25-S-1648					0.0	99.4	0.6											Light Brown poorly graded sand
Boring	B-105	4-6	25-S-1649					0.0	98.3	1.7											Red-Brown poorly graded sand
Boring	B-105	8-10	25-S-1650					1.1	98.4	0.5											Light Brown poorly graded sand

Date Received: 05.06.25 Reviewed By: Date Reviewed: 05.09.25

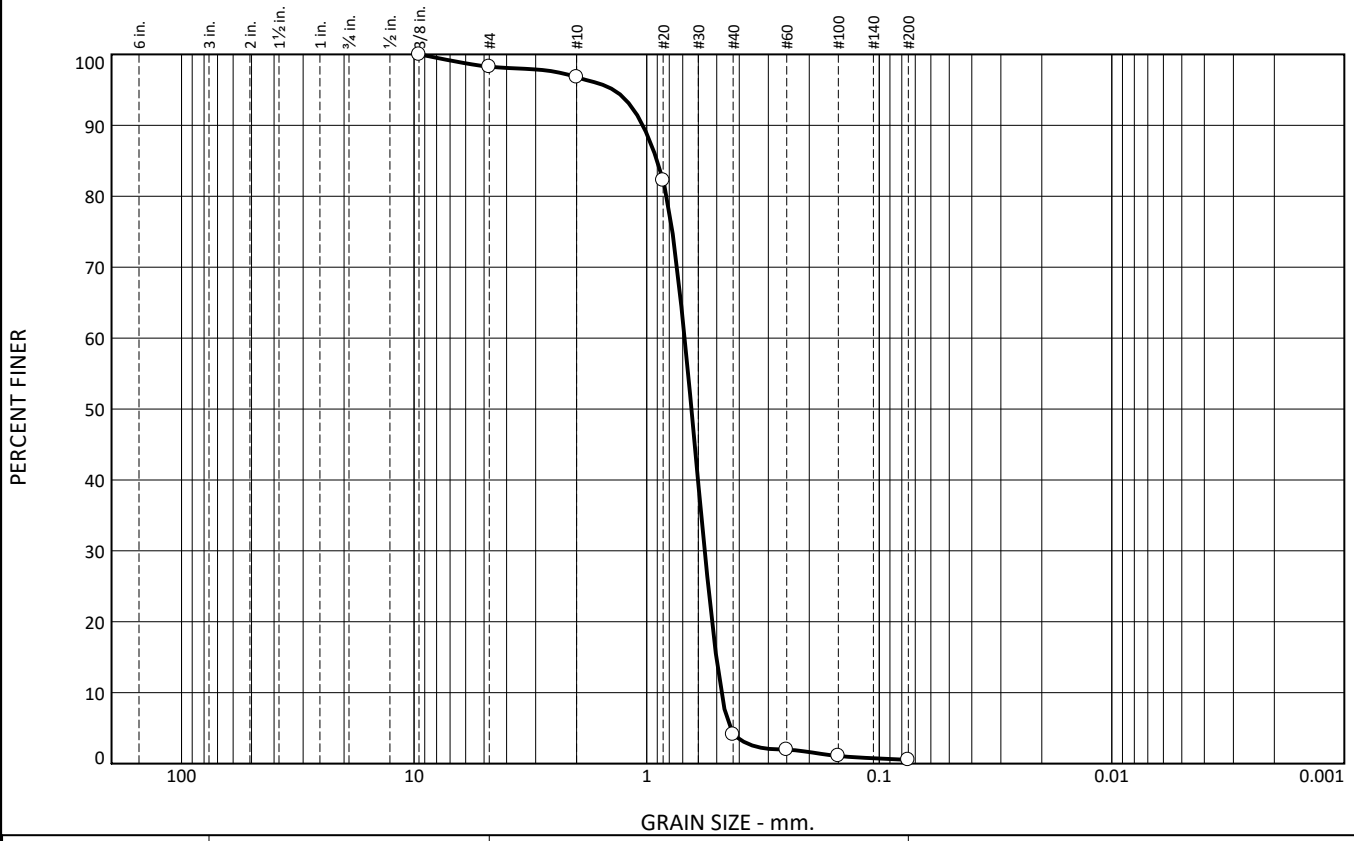
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Proposal No. 608744-136412

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	1.5	92.7	3.6	0.5	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	98.3		
#10	96.8		
#20	82.2		
#40	4.1		
#60	2.0		
#100	1.1		
#200	0.5		

* (no specification provided)

Source of Sample: Boring Depth: 4-6'
Sample Number: B-101

Soil Description
Light Brown poorly graded sand

Atterberg Limits
PL= NP LL= NV PI= NP

Coefficients
D_{90}= 1.0382 D_{85}= 0.9017 D_{60}= 0.6868
D_{50}= 0.6421 D_{30}= 0.5629 D_{15}= 0.5016
D_{10}= 0.4768 C_u= 1.44 C_c= 0.97

Classification
USCS= SP AASHTO= A-1-b

Remarks

Date: 05.09.25

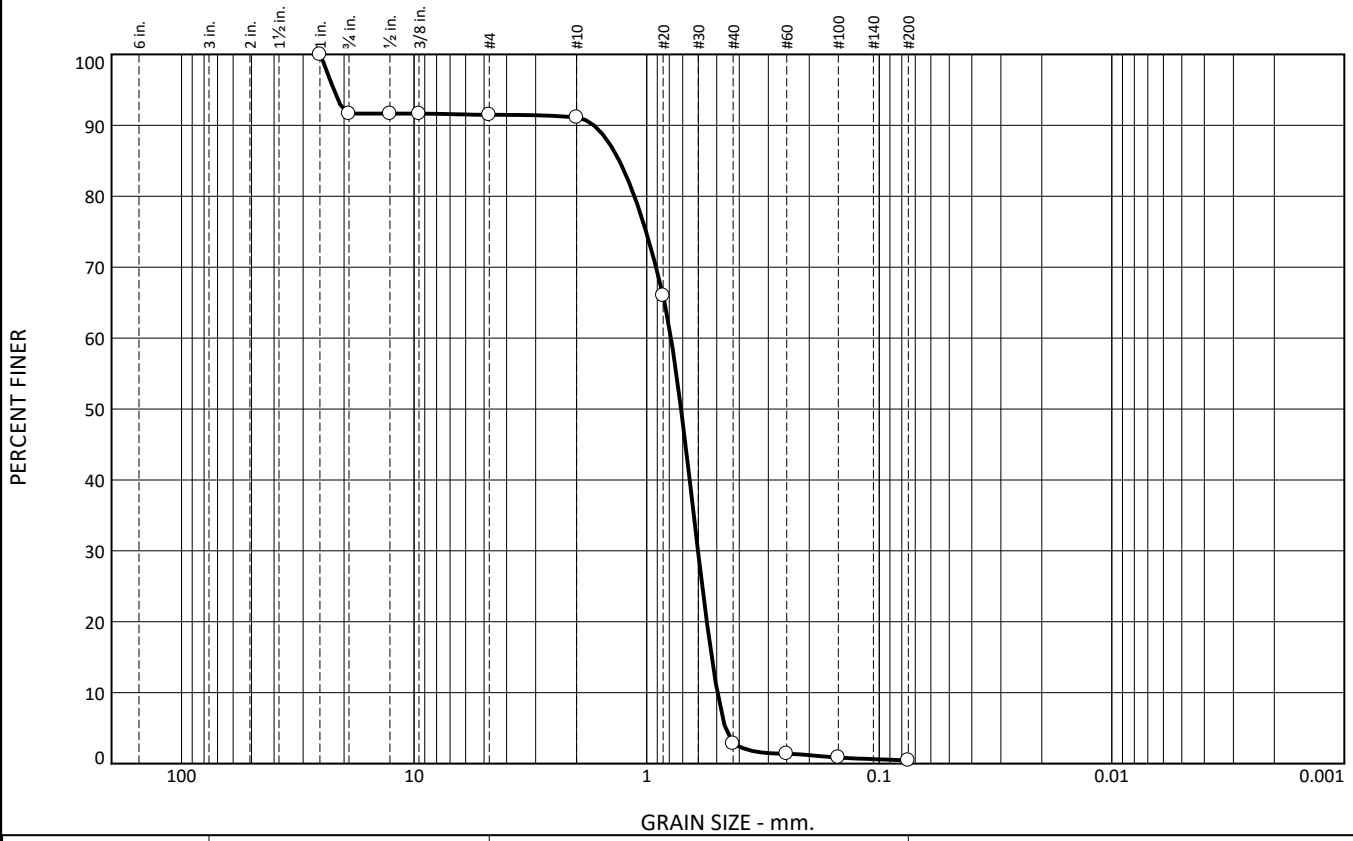
Thielsch Engineering Inc.
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1641

Tested By: TG Checked By: Becca Blake

These results are for the exclusive use of the client for whom they were obtained. This report only relates to items inspect and/or tested. No warranty, expressed or implied, is made.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.3	0.2	0.4	88.3	2.4	0.4	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	91.7		
1/2"	91.7		
3/8"	91.7		
#4	91.5		
#10	91.1		
#20	66.0		
#40	2.8		
#60	1.4		
#100	0.8		
#200	0.4		

* (no specification provided)

Soil Description

Light Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.6859 D_{85}= 1.3109 D_{60}= 0.7851
D_{50}= 0.7115 D_{30}= 0.6016 D_{15}= 0.5251
D_{10}= 0.4961 C_u= 1.58 C_c= 0.93

Classification

USCS= SP AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 14-16'
Sample Number: B-101

Date: 05.09.25

Thielsch Engineering Inc.

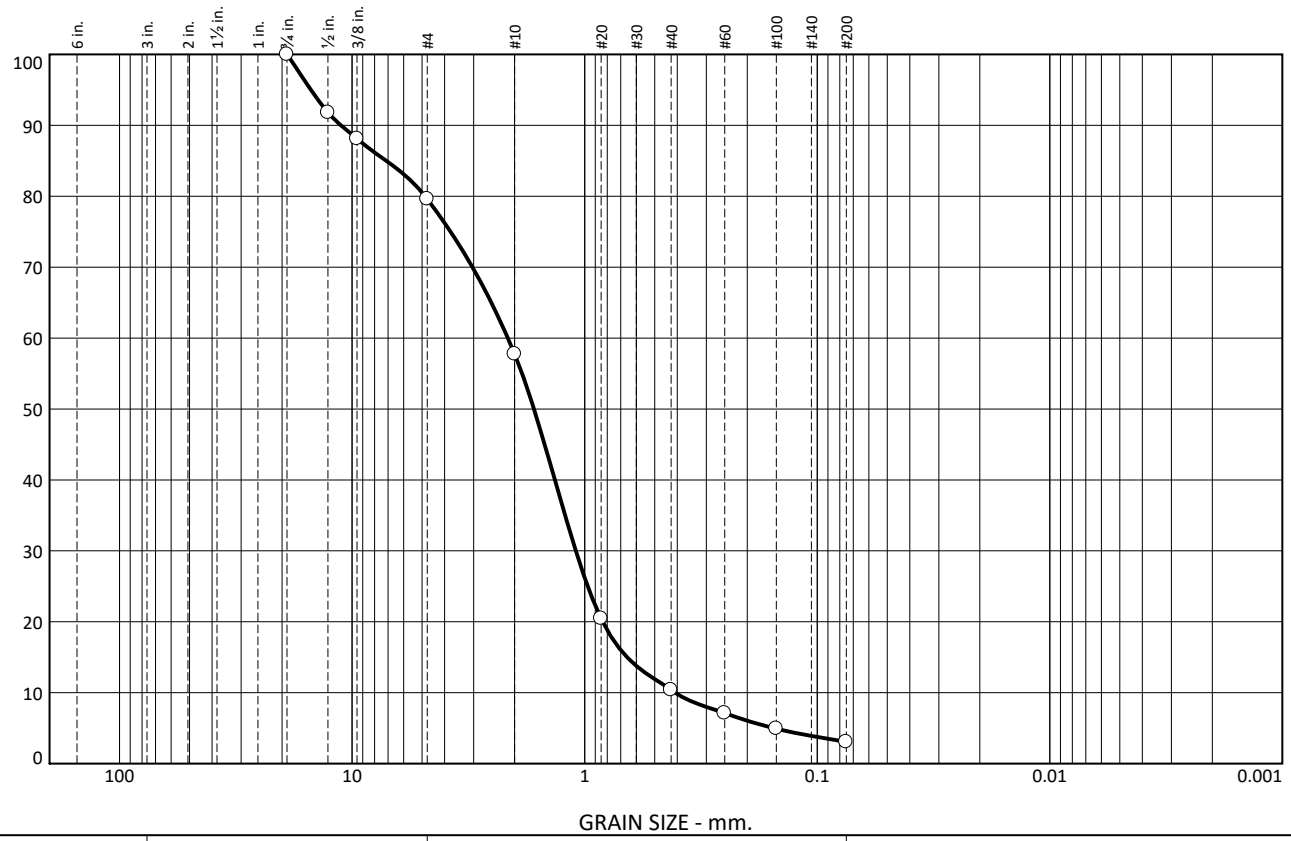
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1642

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	20.4	21.9	47.3	7.4	3.0	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	91.8		
3/8"	88.1		
#4	79.6		
#10	57.7		
#20	20.5		
#40	10.4		
#60	7.1		
#100	4.9		
#200	3.0		

* (no specification provided)

Source of Sample: Boring Depth: 19-21'
Sample Number: B-101

Date: 05.09.25

Soil Description

Light Brown poorly graded sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 11.1640 D_{85}= 7.1256 D_{60}= 2.1393
D_{50}= 1.6525 D_{30}= 1.0913 D_{15}= 0.6576
D_{10}= 0.4087 C_u= 5.23 C_c= 1.36

Classification

USCS= SP AASHTO= A-1-b

Remarks

Thielsch Engineering Inc.

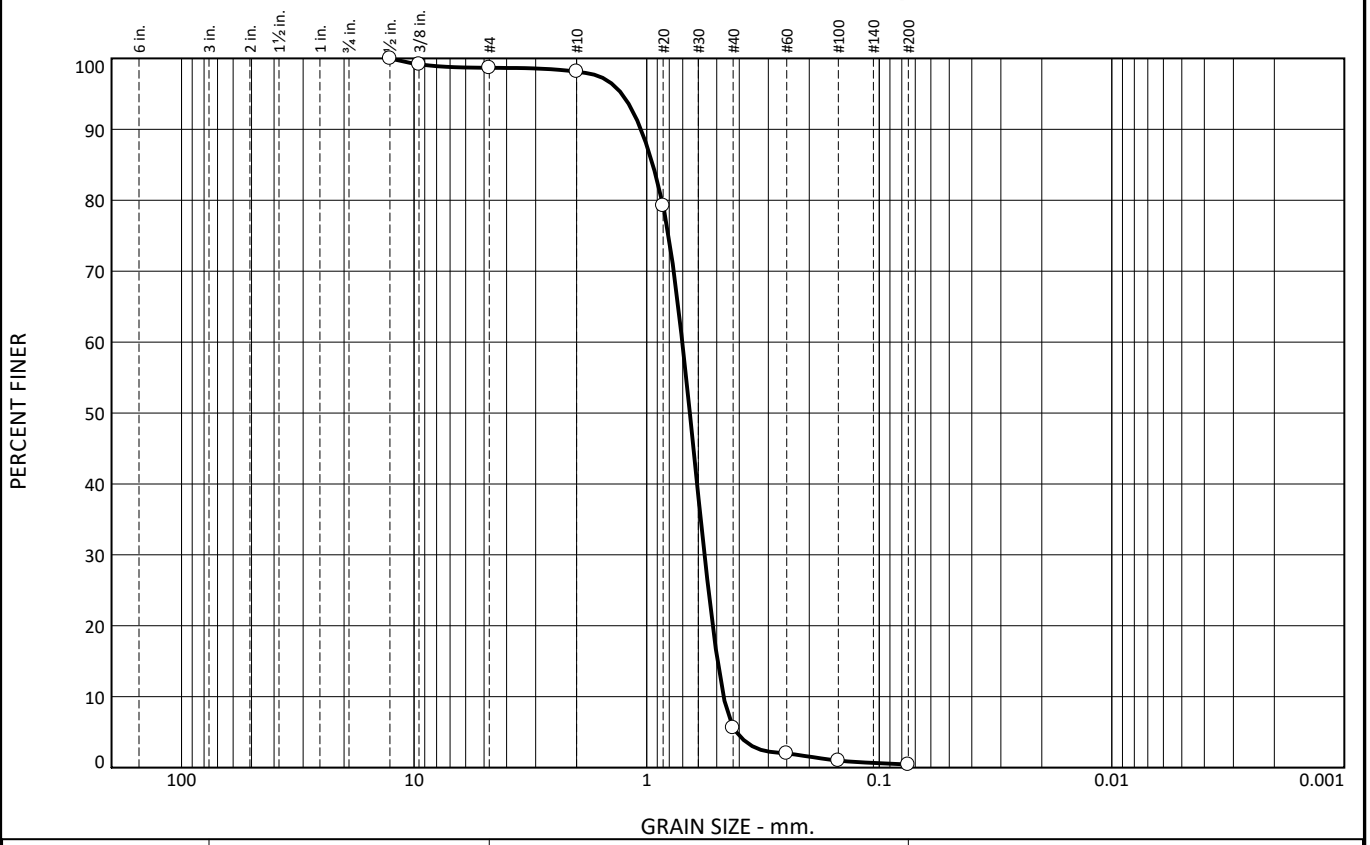
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1643

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	0.6	92.5	5.2	0.4	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.2		
#4	98.7		
#10	98.1		
#20	79.2		
#40	5.6		
#60	2.0		
#100	1.0		
#200	0.4		

* (no specification provided)

Soil Description

Light Grey poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.0579 D_{85}= 0.9408 D_{60}= 0.7029
D_{50}= 0.6523 D_{30}= 0.5639 D_{15}= 0.4954
D_{10}= 0.4668 C_u= 1.51 C_c= 0.97

Classification

USCS= SP AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 4-6'
Sample Number: B-102

Date: 05.09.25

Thielsch Engineering Inc.

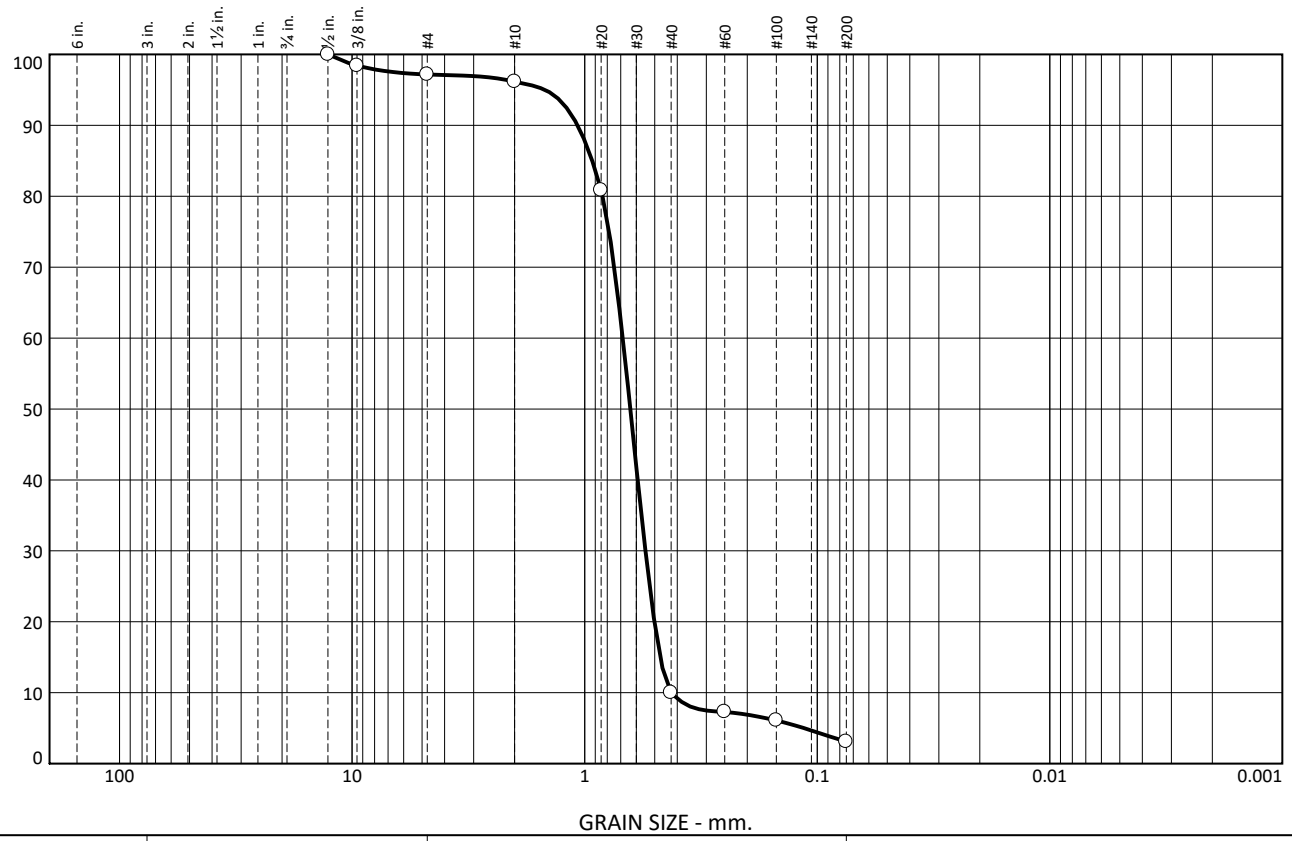
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1644

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.8	1.0	86.2	6.9	3.1	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	98.4		
#4	97.2		
#10	96.2		
#20	80.9		
#40	10.0		
#60	7.3		
#100	6.1		
#200	3.1		

* (no specification provided)

Soil Description

Light Grey poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.0724 D_{85}= 0.9275 D_{60}= 0.6860
D_{50}= 0.6365 D_{30}= 0.5479 D_{15}= 0.4732
D_{10}= 0.4250 C_u= 1.61 C_c= 1.03

Classification

USCS= SP AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 14-16'
Sample Number: B-102

Date: 05.09.25

Thielsch Engineering Inc.

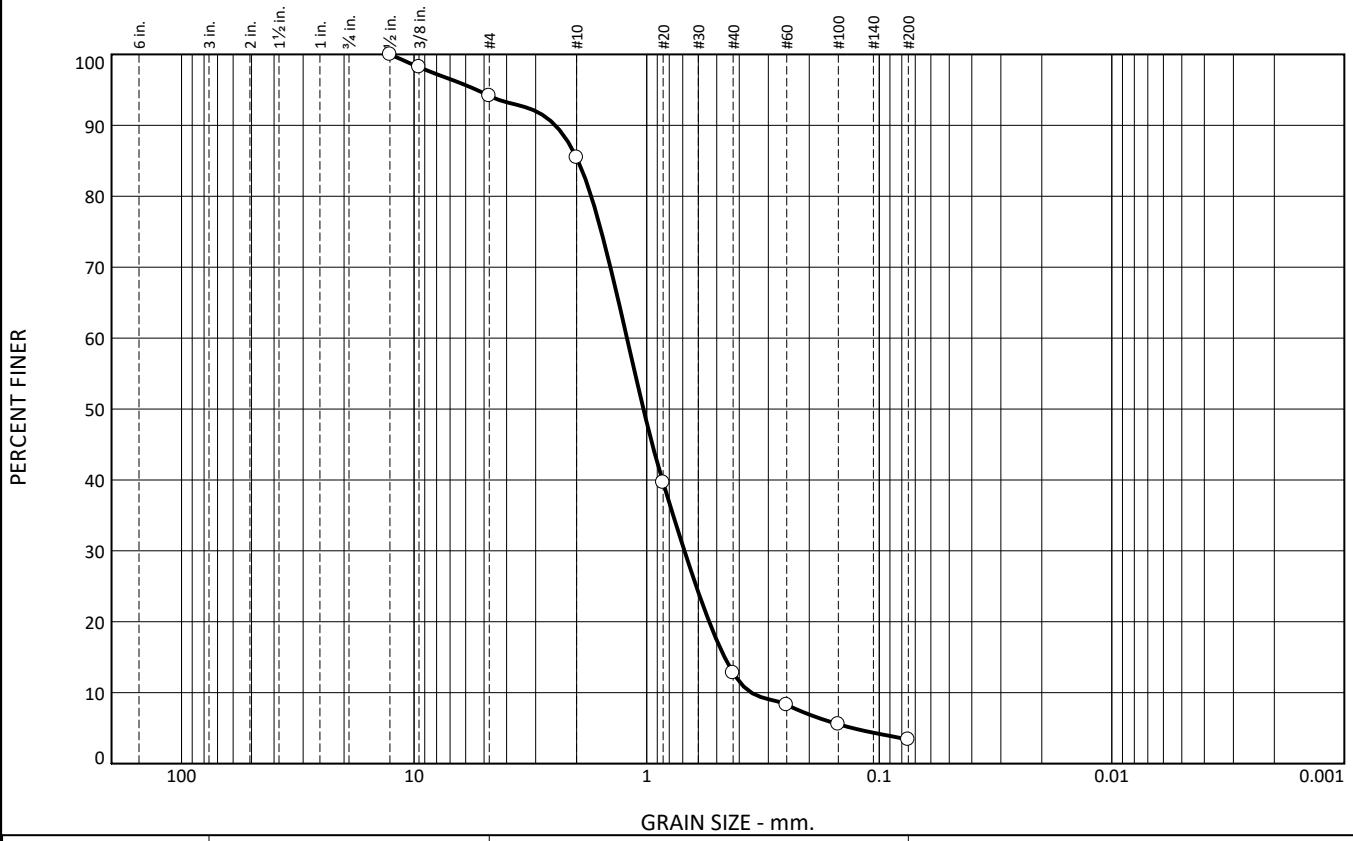
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1645

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.8	8.7	72.7	9.4	3.4	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	98.2		
#4	94.2		
#10	85.5		
#20	39.6		
#40	12.8		
#60	8.3		
#100	5.5		
#200	3.4		

* (no specification provided)

Soil Description

Light Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 2.4695 D_{85}= 1.9702 D_{60}= 1.2155
D_{50}= 1.0323 D_{30}= 0.6879 D_{15}= 0.4623
D_{10}= 0.3546 C_u= 3.43 C_c= 1.10

Classification

USCS= SP AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 19-21'
Sample Number: B-102

Date: 05.09.25

Thielsch Engineering Inc.

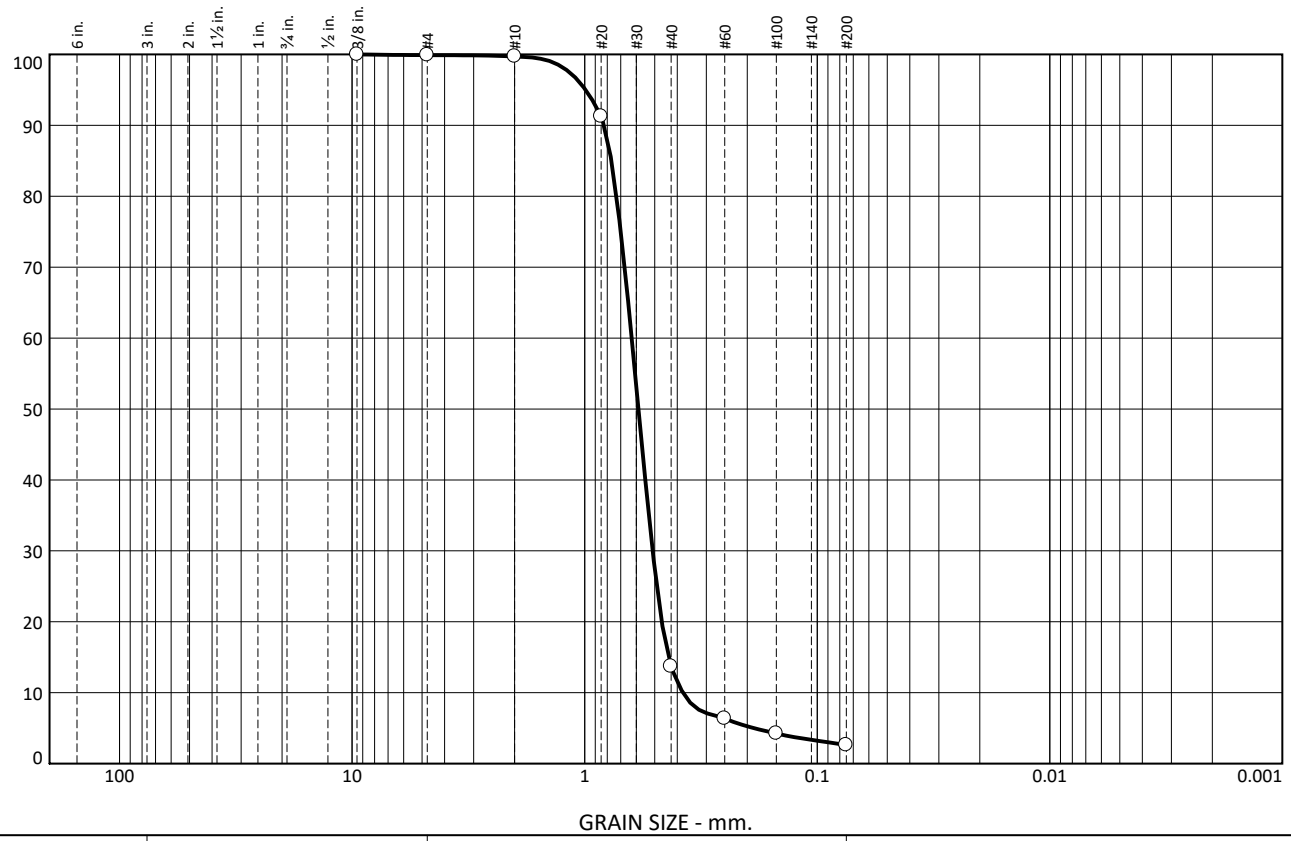
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1646

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	86.0	11.1	2.6	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.9		
#10	99.7		
#20	91.3		
#40	13.7		
#60	6.3		
#100	4.2		
#200	2.6		

* (no specification provided)

Source of Sample: Boring Depth: 4-6'
Sample Number: B-103

Soil Description

Light Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.8234 D_{85}= 0.7670 D_{60}= 0.6278
D_{50}= 0.5872 D_{30}= 0.5099 D_{15}= 0.4363
D_{10}= 0.3784 C_u= 1.66 C_c= 1.09

Classification

USCS= SP AASHTO= A-1-b

Remarks

Date: 05.09.25

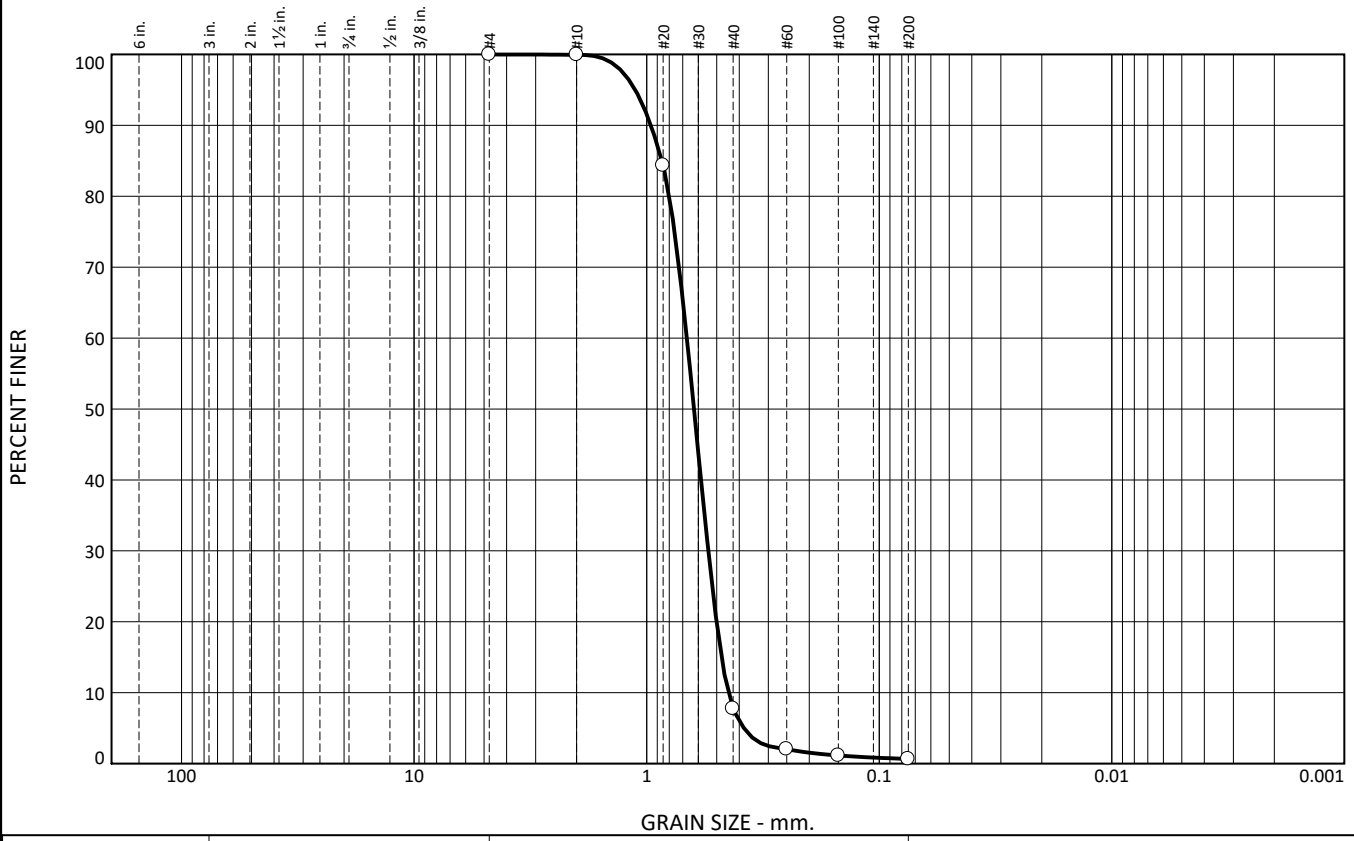
Thielsch Engineering Inc.
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1647

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	92.2	7.1	0.6	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	84.4		
#40	7.7		
#60	2.0		
#100	1.1		
#200	0.6		

* (no specification provided)

Soil Description

Light Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.9587 D_{85}= 0.8603 D_{60}= 0.6718
D_{50}= 0.6259 D_{30}= 0.5432 D_{15}= 0.4764
D_{10}= 0.4462 C_u= 1.51 C_c= 0.98

Classification

USCS= SP AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 4-6'
Sample Number: B-104

Date: 05.09.25

Thielsch Engineering Inc.

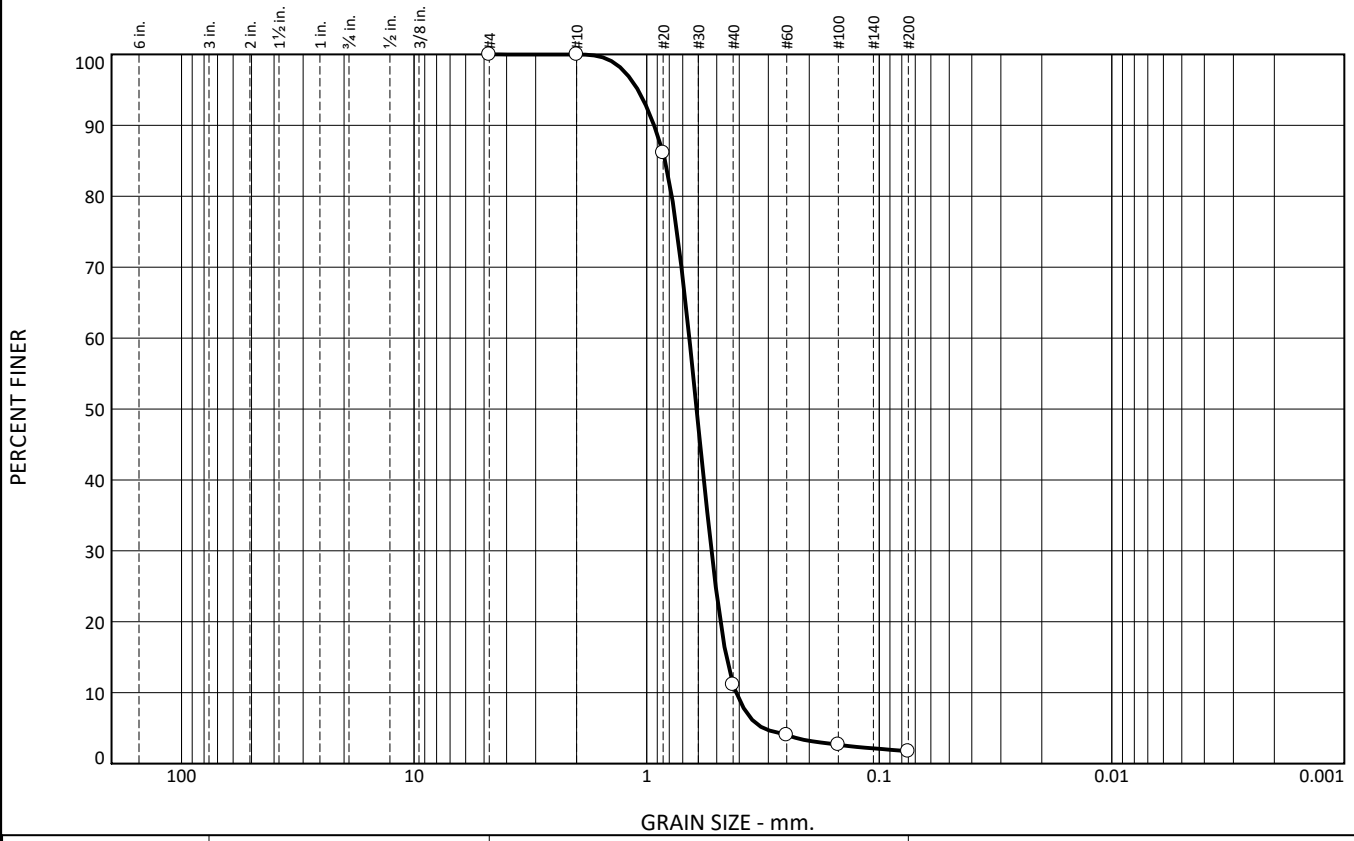
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1648

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	88.9	9.4	1.7	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	86.1		
#40	11.1		
#60	4.0		
#100	2.7		
#200	1.7		

* (no specification provided)

Soil Description

Red-Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.9292 D_{85}= 0.8323 D_{60}= 0.6557
D_{50}= 0.6100 D_{30}= 0.5262 D_{15}= 0.4544
D_{10}= 0.4123 C_u= 1.59 C_c= 1.02

Classification

USCS= SP AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 4-6'
Sample Number: B-105

Date: 05.09.25

Thielsch Engineering Inc.

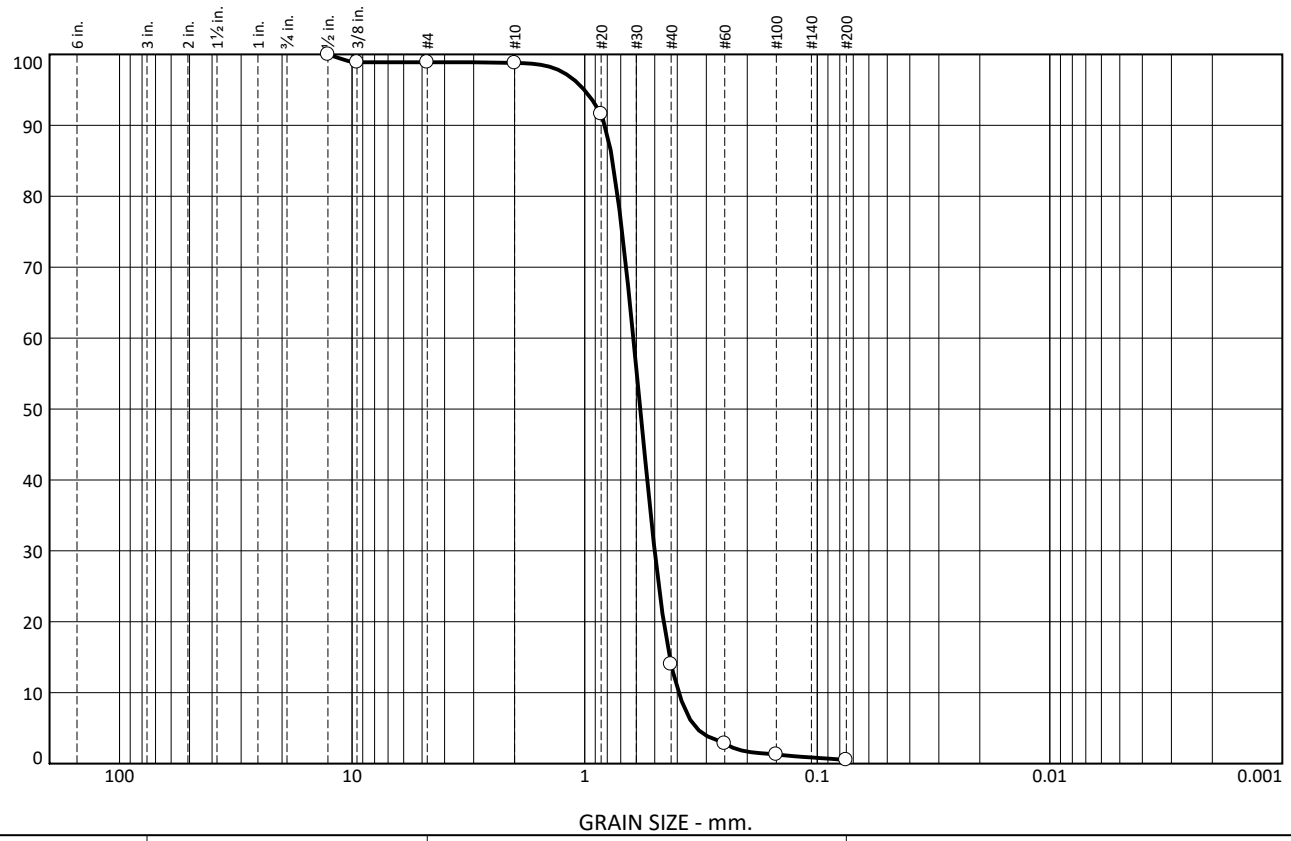
Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1649

Tested By: TG Checked By: Becca Blake

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	0.1	84.8	13.5	0.5	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	98.9		
#4	98.9		
#10	98.8		
#20	91.6		
#40	14.0		
#60	2.8		
#100	1.3		
#200	0.5		

* (no specification provided)

Soil Description

Light Brown poorly graded sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.8152 D_{85}= 0.7587 D_{60}= 0.6176
D_{50}= 0.5767 D_{30}= 0.4998 D_{15}= 0.4314
D_{10}= 0.3943 C_u= 1.57 C_c= 1.03

Classification

USCS= SP AASHTO= A-1-b

Remarks

Source of Sample: Boring Depth: 8-10'
Sample Number: B-105

Date: 05.09.25

Thielsch Engineering Inc.

Cranston, RI

Client: Apex Companies
Project: Ptown Court St. Flooding
Quincy, MA
Project No: R115-2005.00 Fig. 25-S-1650

Tested By: TG Checked By: Becca Blake

ATTACHMENT G

REFERENCES FOR GEOTECHNICAL DESIGN PARAMETERS

Soil Type	Blows/Ft. N	Consistency/ Density[1]	Unconfined Compression Strength TSF	Undrained Shear C = Su = Ou/2 (TSF)	O_{all}[1] (TSF)	Drained Shear Strength (1, 2,) c (PSF)	ϕ° (°)	Unit Weight (1, 2,) γ_m (PCF)	K[3, 4] (PCI) Static	K[3, 4] (PCI) Cyclic	E_{so}[3, 4] (Below WT.)
Cohesive CL/ML	≤2	Very Soft	<.25	<.12	0.25	0	20	100	15	10	.030
	3-4	Soft	0.25-0.5	0.12-0.25	0.5	0	20	105	50	20	.020
	5-8	Med. Stiff	0.5-1.0	0.25-0.5	1.0	50	25	110	200	80	.010
	9-16	Med. Stiff	1.0-2.0	0.5-1.0	1.5	100	28	115	500	200	.007
	17-32	Very Stiff	2.0-4.0	1.0-2.0	2.0	150	30	120	1000	400	.005
	>32	Hard	>4.0	>2.0	3.0	200	32	125	2000	800	.004
									Above WT.	Below WT.	
Granular SW/SP	0-4	Very Loose	--	--	0.5	0	25	90	15	10	--
	5-10	Loose	--	--	1.0	0	28	100	25	20	--
	11-30	Med. Dense	--	--	1.5	0	30-33	115	90	60	--
	31-50	Dense	--	--	2.0	0	33-36	120	225	125	--
	>50	Very Dense	--	--	3.0	0	36-40	130	300	200	
Granular SC/SM	0-4	Very Loose	--	--	0.5	0	25	90	15	10	--
	5-10	Loose	--	--	1.0	0	25	105	30	20	--
	11-30	Med. Dense	--	--	1.5	50	28-30	115	110	80	--
	31-50	Dense	--	--	2.0	75	30-34	125	250	150	--
	>50	Very Dense	--	--	3.0	100	34-36	135	300	225	--
Granular GW/GP	0-4	Very Loose	--	--	1	0	28	90	20	15	--
	5-10	Loose	--	--	2	0	30	100	50	30	--
	11-30	Med. Dense	--	--	3	0	32-34	115	150	100	--
	31-50	Dense	--	--	4	0	34-36	120	300	200	--
	>50	Very Dense	--	--	5	0	36-42	130	500	330	--
Granular GC/GM	0-4	Very Loose	--	--	1	0	26	95	15	10	--
	5-10	Loose	--	--	2	0	28	110	30	20	--
	11-30	Med. Dense	--	--	3	25	28-32	120	110	80	--
	31-50	Dense	--	--	4	50	32-36	130	250	150	--
	>50	Very Dense	--	--	5	75	36-40	140	350	225	--
Bedrock	--	--	--	--	3-30	5000	--	150	4000		.001

For fill soil parameters, based on classification (CL), moisture content, and maximum dry density values, use medium stiff cohesive CL soil parameters.

*Below Water Table

REFERENCES:

1. PaDOT DM-4, Vol. 1, Part B – Table 4.4.4.2P(A), Table 4.6.5.1.2(A).
2. NAVFAC DM-7.1 – Table 9.1.
3. Reese, L.C. and J. Allen, "Drilled Shaft Design and Construction Guidelines Manual", U.S. DOT, FHWA, - Vol. 2, Appendix A, Tables A1 thru A4.
4. Wang, St. and L.C. Reese, "Analyses of Piles Under Lateral Load – Computer Program COM624P for the Micro Computer", Report No. FHWA-SA-91-002, Chapter 3 - Tables 3-1, 3-2, 3-3, & 3-4.

Table C10.6.2.6.1-1—Presumptive Bearing Resistance for Spread Footing Foundations at the Service Limit State Modified after U.S. Department of the Navy (1982)

Type of Bearing Material	Consistency in Place	Bearing Resistance (ksf)	
		Ordinary Range	Recommended Value of Use
Massive crystalline igneous and metamorphic rock: granite, diorite, basalt, gneiss, thoroughly cemented conglomerate (sound condition allows minor cracks)	Very hard, sound rock	120–200	160
Foliated metamorphic rock: slate, schist (sound condition allows minor cracks)	Hard sound rock	60–80	70
Sedimentary rock: hard cemented shales, siltstone, sandstone, limestone without cavities	Hard sound rock	30–50	40
Weathered or broken bedrock of any kind, except highly argillaceous rock (shale)	Medium hard rock	16–24	20
Compaction shale or other highly argillaceous rock in sound condition	Medium hard rock	16–24	20
Well-graded mixture of fine- and coarse-grained soil: glacial till, hardpan, boulder clay (GW-GC, GC, SC)	Very dense	16–24	20
Gravel, gravel-sand mixture, boulder-gravel mixtures (GW, GP, SW, SP)	Very dense Medium dense to dense Loose	12–20 8–14 4–12	14 10 6
Coarse to medium sand, and with little gravel (SW, SP)	Very dense Medium dense to dense Loose	8–12 4–8 2–6	8 6 3
Fine to medium sand, silty or clayey medium to coarse sand (SW, SM, SC)	Very dense Medium dense to dense Loose	6–10 4–8 2–4	6 5 3
Fine sand, silty or clayey medium to fine sand (SP, SM, SC)	Very dense Medium dense to dense Loose	6–10 4–8 2–4	6 5 3
Homogeneous inorganic clay, sandy or silty clay (CL, CH)	Very dense Medium dense to dense Loose	6–12 2–6 1–2	8 4 1
Inorganic silt, sandy or clayey silt, varved silt-clay-fine sand (ML, MH)	Very stiff to hard Medium stiff to stiff Soft	4–8 2–6 1–2	6 3 1

10.6.2.6.2—Semiempirical Procedures for Bearing Resistance

Bearing resistance on rock shall be determined using empirical correlation to the Geomechanic Rock Mass Rating System, RMR. Local experience should be considered in the use of these semi-empirical procedures.

If the recommended value of presumptive bearing resistance exceeds either the unconfined compressive strength of the rock or the nominal resistance of the concrete, the presumptive bearing resistance shall be taken as the lesser of the unconfined compressive strength of the rock or the nominal resistance of the concrete. The nominal resistance of concrete shall be taken as $0.3 f'_c$.

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Table C10.4.6.3-1—Elastic Constants of Various Soils (modified after U.S. Department of the Navy, 1982; Bowles, 1988)

Soil Type	Typical Range of Young's Modulus Values, E_s (ksi)	Poisson's Ratio, ν (dim)
Clay:		
Soft sensitive	0.347–2.08	0.4–0.5 (undrained)
Medium stiff to stiff	2.08–6.94	
Very stiff	6.94–13.89	
Loess	2.08–8.33	0.1–0.3
Silt	0.278–2.78	0.3–0.35
Fine Sand:		
Loose	1.11–1.67	0.25
Medium dense	1.67–2.78	
Dense	2.78–4.17	
Sand:		
Loose	1.39–4.17	0.20–0.36
Medium dense	4.17–6.94	
Dense	6.94–11.11	0.30–0.40
Gravel:		
Loose	4.17–11.11	0.20–0.35
Medium dense	11.11–13.89	
Dense	13.89–27.78	0.30–0.40

Estimating E_s from *SPT N* Value	
Soil Type	E_s (ksi)
Silts, sandy silts, slightly cohesive mixtures	$0.056\,N1_{60}$
Clean fine to medium sands and slightly silty sands	$0.097\,N1_{60}$
Coarse sands and sands with little gravel	$0.139\,N1_{60}$
Sandy gravel and gravels	$0.167\,N1_{60}$

Estimating E_s from q_c (static cone resistance)	
Sandy soils	$0.028q_c$

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Friction Coefficients - Slab on Grade

More Properties

Static Friction Coefficients

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The friction coefficients considered below are for static friction cases where two solid surfaces in contact with each other are resisting relative lateral motion. It should be noted that there can be significant differences between static friction (typically higher) and kinetic (sliding) friction

Amontons's Laws of Dry Friction

- **First Law:** The force of friction is directly proportional to the applied load.
- **Second Law:** The force of friction is independent of the apparent area of contact.
- **Third Law:** Kinetic friction is independent of the sliding velocity.

	Material Combinations		Coefficient of Friction μ_s	
	Material #1	Material #2	min.	max.
☐	Concrete	Clean Sound Rock	0.60	0.70
☐	Concrete	Clean Gravel	0.55	0.60

☐	Concrete	Sandy Gravel	0.55	0.60
☐	Concrete	Coarse Sand	0.55	0.60
☐	Concrete	Clean Fine to Medium Sand	0.45	0.55
☐	Concrete	Silty Medium to Coarse Sand	0.45	0.55
☐	Concrete	Silty or Clayey Gravel	0.45	0.55
☐	Concrete	Clean Fine Sand	0.35	0.45
☐	Concrete	Silty Fine to Medium Sand	0.35	0.45
☐	Concrete	Clayey Fine to Medium Sand	0.35	0.45
☐	Concrete	Fine Sandy Silt	0.40	0.50
☐	Concrete	Non-Plastic Silt	0.40	0.50
☐	Concrete	Very Stiff and Hard Clay	0.40	0.50
☐	Concrete	Medium Stiff to Stiff Clay	0.30	0.35
☐	Concrete	Silty Clay	0.30	0.35
☐	Dressed Soft Rock	Dressed Soft Rock	0.7	0.7
☐	Dressed Hard Rock	Dressed Soft Rock	0.65	0.65
☐	Dressed Hard Rock	Dressed Hard Rock	0.55	0.55

Export All

Additional Resources

1. *Armstrong, Richard C. Engineering And Design: Revision Of Thrust Block Criteria In TM 5-813-5/AFM 88-10, Vol 5 Appendix C. Ft. Belvoir: Defense Technical Information Center, 1992. Print.*
2. *Foundations And Earth Structures. Alexandria, VA.: Dept. of the Navy, Naval Facilities Engineering Command, 1982. Print.*
3. *Potyondy, J. G. "Skin Friction Between Various Soils And Construction Materials". Géotechnique 11.4 (1961): 339-353. Web.*
4. *Author Unknown. (n.d.). Coefficient of friction. Retrieved from http://www.supercivilcd.com/FRICTION.htm*
5. *Fine Software. (n.d.). Table of ultimate friction factors for dissimilar materials. Retrieved from https://www.finesoftware.eu/help/geo5/en/table-of-ultimate-friction-factors-for-dissimilar-materials-01/*
6. *J. Gao, W.D. Luedtke, D. Gourdon, M. Ruths, J.N. Israelachvili, U. Landman. Frictional Forces and Amontons' Law: From the Molecular to the Macroscopic Scale. Atlanta, Georgia. 2003. Feature Article, Print.*
7. *J.R. Barber. Multiscale Surfaces and Amontons' Law of Friction. New York. 2012. Original Paper.*
8. *Scribd. (n.d.). Friction coefficients-slab on grade [uploaded by Jason Toralde]. Retrieved from https://www.scribd.com/document/360755586/Friction-Coefficients-Slab-on-Grade*

"Good engineers don't need to remember every formula; they just need to know where they can find them."

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FISH AND WILDLIFE SERVICE

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New England Ecological Services Field Office
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Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 03/12/2025 19:21:02 UTC
Project code: 2023-0033794
Project Name: 608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST

Federal Nexus: yes
Federal Action Agency (if applicable): Federal Highway Administration

Subject: Federal agency coordination under the Endangered Species Act, Section 7 for '608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST'

Dear Julia Hoogeboom:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on March 12, 2025, for '608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST' (here forward, Project). This project has been assigned Project Code 2023-0033794 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements may not be complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key (DKey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid. Note that conservation measures for northern long-eared bat and tricolored bat may differ. If both bat species are present in the action area and the key suggests more conservative measures for one of the species for your Project, the Project may need to apply***

the most conservative measures in order to avoid adverse effects. If unsure which conservation measures should be applied, please contact the appropriate Ecological Services Field Office.

Determination for the Northern Long-Eared Bat and Tricolored Bat

Based on your IPaC submission and a standing analysis completed by the Service, you determined the proposed Project will have the following effect determinations:

Species	**Listing Status**	**Determination**
Northern Long-eared Bat (*Myotis septentrionalis*)	Endangered	NLAA
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

Federal agencies must consult with U.S. Fish and Wildlife Service under section 7(a)(2) of the Endangered Species Act (ESA) when an action *may affect* a listed species. Tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can *confer* under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if and when the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a NE or NLAA determination from the key to confirm that the determination is still accurate.

Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that consultation on the Action is complete for northern long-eared bat and/or tricolored bat and no further action is necessary unless either of the following occurs:

- new information reveals effects of the action that may affect the northern long-eared bat or tricolored bat in a manner or to an extent not previously considered; or,
- the identified action is subsequently modified in a manner that causes an effect to the northern long-eared bat or tricolored bat that was not considered when completing the determination key.

15-Day Review Period

As indicated above, the Service will notify you within 15 calendar days if we determine that this proposed Action does not meet the criteria for a “may affect, not likely to adversely affect” (NLAA) determination for the northern long-eared bat and/or tricolored bat. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the identified Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that we did not anticipate when developing the key. In such cases, the identified Ecological Services Field Office may request additional information to verify the effects determination reached through the Northern Long-eared Bat and Tricolored Bat DKey.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination key for the northern long-eared bat and tricolored bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Roseate Tern *Sterna dougallii dougallii* Endangered
- Rufa Red Knot *Calidris canutus rufa* Threatened

You may coordinate with our Office to determine whether the Action may affect the species and/or critical habitat listed above. Note that reinitiation of consultation would be necessary if a new species is listed or critical habitat designated that may be affected by the identified action before it is complete.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference Project Code 2023-0033794 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST

2. Description

The following description was provided for the project '608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS ON SHANK PAINTER ROAD, FROM RTE 6 TO BRADFORD ST':

> 608744 - PROVINCETOWN- CORRIDOR IMPROVEMENTS AND RELATED WORK ON SHANK PAINTER ROAD, FROM ROUTE 6 TO BRADFORD STREET
> Work on this project consists of roadway reconstruction, sidewalk construction and reconstruction, drainage upgrades, pavement markings and signs along Shank Painter Road. Geometric improvements are proposed at the Route 6/Shank Painter Road intersection. Also included in the project is a road diet on Route 6 from Shank Painter Road to the National Seashore, which will allow for improved bicycle and pedestrian accommodation in the form of a shared use path.
> Red Knot and Roseate Tern: After consulting with the Massachusetts Natural Heritage and Endangered Species Program (NHESP), it was determined that there is no data to suggest the presence of habitat and/or individuals at this project location
> Tricolored Bat and Monarch Butterfly (both proposed): The project will not jeopardize the existence of the proposed species

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.050205000000005,-70.20437590567133,14z



DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect, but not likely to adversely affect” for a least one species covered by this determination key.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed bats or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. Is the action area wholly within Zone 2 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

3. Does the action area intersect Zone 1 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

4. Does any component of the action involve leasing, construction or operation of wind turbines? Answer 'yes' if the activities considered are conducted with the intention of gathering survey information to inform the leasing, construction, or operation of wind turbines.

   Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

   No

5. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

6. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

   Yes

7. FHWA, FRA, and FTA have completed a range-wide programmatic consultation for transportation- related actions within the range of the Indiana bat, northern long-eared bat and tricolored bat.

   Does your proposed action fall within the scope of this programmatic consultation?

   Note: If you are unsure, but your action is transportation related, please select "Yes" and use the FHWA, FRA, FTA Assisted Determination Key (FHWA DKey) in IPaC to determine if the programmatic consultation is applicable to your action. Return to this key and answer 'no' to this question if it is not.

   No

8. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

   Note: This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

   Yes

9. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

   No

10. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

    No

11. [Semantic] Is the action area located within 0.5 miles of a known bat hibernaculum?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

12. Does the action area contain any winter roosts or caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating bats?

    No

13. Does the action area contain (1) talus or (2) anthropogenic or naturally formed rock shelters or crevices in rocky outcrops, rock faces or cliffs?

    No

14. Will the action cause effects to a bridge?

    Note: Covered bridges should be considered as bridges in this question.

    No

15. Will the action result in effects to a culvert or tunnel at any time of year?

    No

16. Are trees present within 1000 feet of the action area?

    Note: If there are trees within the action area that are of a sufficient size to be potential roosts for bats answer "Yes". If unsure, additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

17. Does the action include the intentional exclusion of bats from a building or structure?

    Note: Exclusion is conducted to deny bats' entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats or tricolored bats are present, answer "Yes." Answer "No" if there are no signs of bat use in the building/structure. If unsure, contact your local Ecological Services Field Office to help assess whether northern long-eared bats or tricolored bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term "National Wildlife Control Operators Association bats"). Also see the White-Nose Syndrome Response Team's guide for bat control in structures.

    No

18. Does the action involve removal, modification, or maintenance of a human-made structure (barn, house, or other building) **known or suspected to contain roosting bats?**

    No

19. Will the action cause construction of one or more new roads open to the public?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

20. Will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic permanently or temporarily on one or more existing roads?

    Note: For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

    No

21. Will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

    For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

22. Will the proposed Action involve the creation of a new water-borne contaminant source (e.g., leachate pond, pits containing chemicals that are not NSF/ANSI 60 compliant)?

    Note: For information regarding NSF/ANSI 60 please visit https://www.nsf.org/knowledge-library/nsf-ansi-standard-60-drinking-water-treatment-chemicals-health-effects

    No

23. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

    No

24. Will the action include drilling or blasting?

    No

25. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use)?

    No

26. Will the proposed action involve the use of herbicides or other pesticides other than herbicides (e.g., fungicides, insecticides, or rodenticides)?

    No

27. Will the action include or cause activities that are reasonably certain to cause chronic or intense nighttime noise (above current levels of ambient noise in the area) in suitable summer habitat for the northern long-eared bat or tricolored bat during the active season?

    Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time. Sources of chronic or intense noise that could cause adverse effects to bats may include, but are not limited to: road traffic; trains; aircraft; industrial activities; gas compressor stations; loud music; crowds; oil and gas extraction; construction; and mining.

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

28. Does the action include, or is it reasonably certain to cause, the use of permanent or temporary artificial lighting within 1000 feet of suitable northern long-eared bat or tricolored bat roosting habitat?

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

29. Will the action cause an increase in the extent of suitable forested habitat exposed to artificial lighting?

    Yes

30. Will the action use only downward-facing, full cut-off lens lights (with same intensity or less for replacement lighting) when installing new or replacing existing permanent lights?

    Or for those transportation agencies using the Backlight, Uplight, Glare (BUG) system developed by the Illuminating Engineering Society, will all three ratings (backlight, uplight, and glare) be as close to zero as is possible, with a priority of "uplight" of 0?

    Yes

31. Will the action direct any temporary lighting away from suitable northern long-eared bat or tricolored bat roosting habitat when bats may be present?

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

32. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

    Yes

33. Will the proposed action occur exclusively in an already established and currently maintained utility right-of-way?

    No

34. Does the action include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property? See hazard tree note at the bottom of the key for text that will be added to response letters

    Note: A "hazard tree" is a tree that is an immediate threat to lives, public health and safety, or improved property.

    No

35. Does the project intersect with the 0- 9.9% forest density category?

    Automatically answered
    No

36. Does the project intersect with the 10.0- 19.9% forest density category map?

    Automatically answered
    Yes

37. Does the project intersect with the 20.0- 29.9% forest density category map?

    Automatically answered
    No

38. Does the project intersect with the 30.0- 100% forest density category map?

    Automatically answered
    No

39. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 5 acres in total extent?

    No

40. Will the proposed action result in the use of prescribed fire?

    Note: If the prescribed fire action includes other activities than application of fire (e.g., tree cutting, fire line preparation) please consider impacts from those activities within the previous representative questions in the key. This set of questions only considers impacts from flame and smoke.

    No

41. Does the action area intersect the northern long-eared bat species list area?

    Automatically answered
    Yes

42. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats?

    Automatically answered
    No

43. [Semantic] Is the action area located within 150 feet of a documented northern long-eared bat roost site?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

44. Is suitable summer habitat for the northern long-eared bat present within 1000 feet of project activities?
If unsure, answer "Yes."

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

45. Has a presence/probable absence summer bat survey targeting the northern long-eared bat following the Service's Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines been conducted within the project area?

    Yes

46. Was the survey conducted within the last 5 years?

    Yes

47. Did you coordinate with your Ecological Services Field Office (ESFO) and receive approval of the results? If NO, please contact the appropriate local ESFO before completing this determination key - you may change your answer to 'yes' only after coordinating with the ESFO and uploading survey results.

    Yes

    SUBMITTED DOCUMENTS

    - *608744_rpt_provincetown_nleb_survey_20221025.pdf https://ipac.ecosphere.fws.gov/project/VUDRYWXZDZDBJANS2M4YROTMNY/projectDocuments/121153265*

48. Did survey results demonstrate the probable absence of northern long-eared bats?

    Yes

49. Does the action area intersect the tricolored bat species list area?

    Automatically answered
    Yes

50. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

51. Has a presence/probable absence bat survey targeting the tricolored bat and following the Service's Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines been conducted within the project area?

    Yes

52. Was the presence/probable absence survey conducted within the last 5 years?

    Yes

53. Did you coordinate with your Ecological Services Field Office (ESFO) and receive approval of the results? If NO, please contact the appropriate local ESFO before completing this determination key - you may change your answer to 'yes' only after coordinating with the ESFO and uploading survey results.

    Yes

54. Did survey results demonstrate the probable absence of tricolored bats?

    Yes

55. Do you have any documents that you want to include with this submission?

    No

PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

2.7

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Julia Hoogeboom
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email julia.a.hoogeboom@dot.state.ma.us
Phone: 8574452880

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

DOCUMENT A00856

Northern Long-Eared Bat (NLEB) Presence/Absence Survey

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October 25, 2022

Attention: Tim Dexter
Fish & Wildlife Program Coordinator
Massachusetts Department of Transportation – Highway Division
Ten Park Plaza, Room 4260
Boston, MA 02116-3973

Dear Tim,

Project	Northern Long-eared Bat (NLEB) Presence/Absence Survey
MassDOT Project #	608744
Town	Provincetown, Massachusetts
Surveyor Name/Firm	Stantec Consulting Services Inc.
Detector Operation Dates	July 28–August 2, 2022
Survey Results	**NLEB NOT DETECTED**

The attached report contains the results of the Massachusetts Department of Transportation northern long-eared bat (*Myotis septentrionalis*; NLEB) summer presence/absence survey performed for proposed corridor improvements and related work on Shank Painter Road (MassDOT # 608744) in Provincetown, Massachusetts. Acoustic detectors deployed by Stantec Consulting Services Inc. and automated U.S. Fish and Wildlife Service-approved software (Kaleidoscope Pro version 5.4.7 [KPro]) did not detect any NLEB passes or indicate presence based on nightly maximum likelihood estimate scores. Twenty-six individual bat passes were autoclassified by KPro as the state-endangered little brown bat (*Myotis lucifugus*), and presence of this species was confirmed during visual vetting. Twenty-five passes were autoclassified as the state-endangered tricolored bat (*Perimyotis subflavus*), though presence was not confirmed during visual vetting. No passes were autoclassified as the state-endangered eastern small-footed bat (*Myotis leibii*). The required USFWS Region 5 Bat Reporting Form and 2022_MassDOT_Batsurvey_Stantec shapefile will be provided to you under separate cover.

Regards,

Stantec Consulting Services Inc.



Alex Pries
Project Manager
Phone: (603) 260-7434
Fax: (207) 729-2715
Alex.Pries@stantec.com

Attachment: NLEB Survey Report for Provincetown, 608744

To:	Tim Dexter, Fish and Wildlife Program Coordinator	From:	Alex Pries
	Massachusetts Department of Transportation		Auburn, New Hampshire Office
File:	179410726	Date:	October 25, 2022

Reference: Corridor Improvements and Related Work on Shank Painter Road, Provincetown, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

INTRODUCTION

The Massachusetts Department of Transportation (MassDOT) retained Stantec Consulting Services Inc. (Stantec) to conduct an acoustic survey for the presence or probable absence of populations of the federally threatened and state-listed endangered northern long-eared bat (*Myotis septentrionalis*; NLEB) for proposed corridor improvements and related work on Shank Painter Road in Provincetown, Massachusetts (Project). The Project includes potential tree clearing along 2.32 kilometers (km) of forested habitat (Figure 1). Based on desktop review, approximately 0.86 km of proposed work along Shark Painter Road is an urbanized area without suitable bat habitat. Removal of this area reduced the total project length with potential bat habitat to 1.46 km. The purpose of the survey was to determine if this species was using these forested areas at the Project during the 2022 summer maternity season. The survey was conducted according to methods outlined in the U.S. Fish and Wildlife Service's (USFWS) March 2022 *Range-wide Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines* (USFWS Guidelines).[1] Stantec provided a Study Plan (Appendix A) for this acoustic survey to MassDOT on June 22, 2022, and USFWS on June 27, 2022, based on USFWS Guidelines. After USFWS indicated on July 11, 2022, that review of the Study Plan would be delayed, MassDOT approved commencement of field surveys on July 12, 2022, and Stantec conducted surveys on July 28–August 2. The USFWS Guidelines identified a survey window of May 15 to August 15 for acoustic surveys. This memorandum summarizes methods and results of the acoustic bat survey for the Project.

METHODS

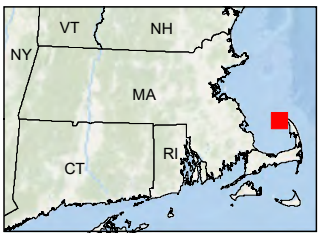
FIELD SURVEY

Surveys were conducted according to the methods outlined in the Study Plan (Appendix A). The USFWS Guidelines specify survey effort for acoustic surveys based either on an area method or a linear method. Stantec determined that the linear method was appropriate for this Project given the linear nature of potential tree clearing limits. Per survey efforts outlined in the USFWS Guidelines: Phase 2 Acoustic Surveys for linear projects, at least four detector-nights per km of suitable summer habitat were required for the Project. For the purposes of this survey, we have conservatively assumed that all forested areas immediately adjacent to the Project provide potential roost habitat for NLEB (e.g., suitable summer habitat) and may potentially be cleared during project construction. Accordingly, Stantec conducted eight detector-nights (two detectors deployed for four nights) of acoustic surveys as outlined in the Study Plan.

Stantec identified two survey locations based on review of aerial imagery during a desktop analysis, taking into consideration land permission access to the MassDOT right-of-way associated with the Project. Stantec biologists determined detector placement in the field according to USFWS Guidelines, positioning the detectors in locations that could be suitable as potential NLEB foraging habitat and appropriate for recording search-phase bat echolocations appropriate for identification. Detectors were positioned along forested edges next to small clearings (Figure 1). We recorded the location of the survey sites and habitat information using the Survey123 mobile app on an iPhone and photographed the sites (Appendix B).

[1] https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines





Legend

- Acoustic Survey Location
- Project Area

0 1,000 Feet

(At original document size of 8.5x11)
1:12,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Provincetown, Massachusetts

Prepared by MM on 2022-08-22
TR by KWH on 2022-08-22
IR Review by LJ on 2022-08-22

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

Figure No.
1

Title
Northern Long-eared Bat Acoustic Survey Location – Provincetown

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-08-19 By: memason

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Stantec used two full-spectrum acoustic bat detectors (Wildlife Acoustics© Song Meter Mini Bat) for the survey, inspecting the detectors and ensuring the built-in omnidirectional microphones met manufacturer calibration standards before deployment. The microphones were tested again in the field with the use of ultrasonic noise and inspection of proper microphone response. Each detector was deployed in an area with minimal vegetation within 10 meters (m) and at least 3 m away from obstructions in any direction. Detectors were placed at least 200 m apart from one another. Each detector was mounted approximately 3 m above ground level and oriented horizontally to the ground to sample an optimal volume of air space in accordance with the USFWS Guidelines. The audio and data storage settings on each detector were set according to defaults recommended by the manufacturer (e.g., detectors will operate in "triggered.wav" mode using default trigger threshold settings). Each detector was set to record from 30 minutes before sunset until 30 minutes after sunrise and was powered with alkaline batteries.

DATA ANALYSIS

Although acoustic surveys focused on detecting NLEB, bat detectors are designed to detect all bats vocalizing in the vicinity of the detectors. Therefore, additional listed bat species can be detected, including eastern small-footed bat *(Myotis leibii*; state-listed endangered), little brown bat (*Myotis lucifugus*; state-listed endangered), and tricolored bat (*Perimyotis subflavus*; state-listed endangered). Though the federally endangered Indiana bat (*Myotis sodalis*) is listed as endangered in Massachusetts, the state occurs outside the known range of this species and Stantec does not believe that this species occurs at the Project. Therefore, Indiana bat was not included in acoustic analysis.

Stantec performed an initial coarse visual analysis of data to confirm that high frequency bats were recorded. Data were then analyzed using Kaleidoscope Pro Software version 5.4.7 (KPro; classifier version 5.4.0), using a "-1" sensitivity setting and selecting the appropriate species list for the Massachusetts region (excluding Indiana bat). This analysis method has been approved by the USFWS as suitable for analyzing full-spectrum bat data collected by Song Meter units.

KPro analyzes each acoustic file and assigns it a bat species identification if the program determines it contains a bat call (pass) opposed to acoustic static. KPro also assigns a maximum likelihood estimate (MLE) to each species identified, at each detector site, for each night surveyed. According to the USFWS Guidelines, presence or probable absence of NLEB is based on the species' MLE generated by KPro for each detector site for each night surveyed. An MLE of less than 0.05 indicates probable presence and an MLE greater than 0.05 indicates probable absence of that species at that detector site for that night.

Stantec visually vetted all files recorded on nights with probable NLEB presence (MLE of less than 0.05) to evaluate the plausibility of NLEB presence on those nights. We also reviewed all high frequency files identified as any state-listed bat species by the program to evaluate the plausibility of additional bat species of interest.

RESULTS

HABITAT SURVEY

The Project area includes a road traversing residential and commercial areas interspersed with fragmented stretches of coastal pine forest adjacent to wetland habitat (Figure 1). The forested habitat consists of mixed forest dominated by pitch pine (*Pinus rigida*) and scrub oak (*Quercus ilicifolia*) with a moderate to open canopy closure. Many potential bat flight and foraging corridors and potential roost habitat exist within the site and the surrounding area.

FIELD SURVEY

Stantec deployed the acoustic detectors on July 28, 2022, and surveys took place during the nights of July 28–August 2. Stantec monitored weather conditions at weather station KMAPROVI52 (Weather Underground, located approximately 0.5 miles northeast of the Project) after each night and confirmed that weather met the following parameters outlined in the USFWS Guidelines during the first 5 hours surveyed after sunset:

- Temperatures exceeded 50°F
- No precipitation or fog for 30 minutes or more
- Sustained wind speeds did not exceed 9 miles/hour for 30 minutes or more

Detectors were inspected in the field on August 3 to confirm proper operation during four nights of deployment. The detectors operated successfully during all nights of survey and were retrieved.

ACOUSTIC ANALYSIS

Coarse visual analysis confirmed presence of high-frequency bat passes at the site. We included only the first four nights of survey for each detector that met weather condition requirements in the acoustic analysis, meeting the minimal level of survey effort according to USFWS Guidelines. Analysis with KPro software did not identify any passes as NLEB or indicate presence of NLEB based on nightly MLE scores. Visual QA/QC, performed by Laura Berube and Caroline Byrne (see resumes in Appendix C) did not indicated presence of NLEB (Table 1).

KPro identified 26 other passes as state-endangered little brown bat but did not indicated presence for the species based on nightly MLE scores. Visual QA/QC determined presence of this species at detector site PR-1 (Table 1). KPro also identified 25 passes as state-endangered tricolored bat but did not indicate presence for the species based on nightly MLE scores. Visual QA/QC did not determine presence of this species at the Project (Table 1). KPro did not identify any passes as state-endangered eastern small-footed bat or indicated presence of the species based on nightly MLE scores (Table 1).

Additional species recorded at the Project included big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), and eastern red bat (*Lasiurus borealis*). Overall, hoary bats accounted for most recorded bat activity, followed by eastern red bats and big brown bats. Of both detector sites, site PR-2 had the most bat activity overall with a total of 988 calls.

See Appendix D for examples of bat passes documented at the Project. Original full-spectrum and converted zero-crossing data files have been archived electronically and can be made available upon request. We have populated the USFWS Region 5 Bat Reporting Form and the 2022_MassDOT_Batsurvey_Stantec shapefile as electronic attachments.

Table 1. Acoustic analysis results for state- and/or federally listed bat species based on KPro software and visual QAQC for acoustic surveys for corridor improvements and related work on Shank Painter Road, Provincetown, Massachusetts.

Species	Night	Detector Site		Visual QA/QC Notes
		KPro Analysis		
		# Passes (Nightly MLE Score)		
		PR-1	PR-2	
northern long-eared bat	28-Jul	0 (1.00)	0 (1.00)	No passes/No presence
	29-Jul	0 (1.00)	0 (1.00)	No passes/No presence
	30-Jul	0 (1.00)	0 (1.00)	No passes/No presence
	31-Jul	0 (1.00)	0 (1.00)	No passes/No presence
eastern small-footed bat	28-Jul	0 (1.00)	0 (1.00)	No passes/No presence
	29-Jul	0 (1.00)	0 (1.00)	No passes/No presence
	30-Jul	0 (1.00)	0 (1.00)	No passes/No presence
	31-Jul	0 (1.00)	0 (1.00)	No passes/No presence
little brown bat	28-Jul	2 (1.00)	1 (1.00)	Presence confirmed at PR-1 based on visual QA/QC. Passes at PR-2 determined to be eastern red bat based on visual QA/QC
	29-Jul	3 (1.00)	1 (1.00)	Presence confirmed at PR-1 based on visual QA/QC. Passes at PR-2 determined to be eastern red bat based on visual QA/QC
	30-Jul	8 (0.99)	2 (1.00)	Presence not confirmed, passes at both sites determined to be eastern red bat based on visual QA/QC
	31-Jul	7 (1.00)	2 (1.00)	Presence confirmed at PR-1 based on visual QA/QC. Passes at PR-2 determined to be eastern red bat based on visual QA/QC
tricolored bat	28-Jul	0 (1.00)	5 (1.00)	Presence not confirmed, passes determined to be eastern red bat based on visual QA/QC
	29-Jul	2 (1.00)	1 (1.00)	Presence not confirmed, passes determined to be eastern red bat based on visual QA/QC
	30-Jul	4 (1.00)	2 (1.00)	Presence not confirmed, passes determined to be eastern red bat based on visual QA/QC
	31-Jul	11 (1.00)	0 (1.00)	Presence not confirmed, passes determined to be eastern red bat based on visual QA/QC

CONCLUSIONS

Acoustic surveys for the Project were conducted according to requirements outlined by the USFWS Guidelines and the approved Study Plan submitted to the USFWS and MassDOT prior to fieldwork. NLEB was not detected during the survey or confirmed during visual vetting, indicating probable absence of maternity colonies of the species at the Project during the 2022 field season. Little brown bat presence was documented based on autoclassification and visual analysis, and tricolored bat presence was documented based on autoclassification and nightly MLE scores, but not confirmed during visual vetting. Eastern small-footed bat presence was not documented at the Project. Bat activity occurred at both surveyed sites, consisting primarily hoary bats, eastern red bats, and big brown bats.

Stantec Consulting Services Inc.

Alex Pries
Project Manager
Phone: (603) 260-7434
Fax: (207) 729-2715
Alex.Pries@Stantec.com

Attachments:
APPENDIX A Study Plan
APPENDIX B Acoustic Detector Photographs
APPENDIX C Resumes of Laura Berube and Caroline Byrne
APPENDIX D Screenshots of Bat Passes

APPENDIX A Study Plan

2022 MassDOT Northern Long-Eared Bat Acoustic Surveys Study Plan

June 21, 2022

Prepared for:

Massachusetts Department of Transportation
10 Park Plaza, Room 4260
Boston, MA 02116

Prepared by:

Stantec Consulting Services Inc.
30 Park Drive
Topsham, ME 04086

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1.0 INTRODUCTION

The Massachusetts Department of Transportation (MassDOT) has retained Stantec Consulting Services Inc. (Stantec) to conduct acoustic surveys for the presence of northern long-eared bats (*Myotis septentrionalis;* NLEB) along the following 20 linear transportation improvement projects requiring tree clearing:

- Orange, MA: Reconstruction of North Main Street, from School Street to Lincoln Avenue, includes relocation of Fall Hill Brook culvert (MassDot Project #603371)
- West Brookfield, MA: Resurfacing and related work on Route 9, from Ware T.L. to 850 feet west of Welcome Road (MassDot Project #606517)
- Wales, MA (1): Reconstruction and improvements on Monson Road, from the Monson T.L. to Reed Hill Road (MassDot Project #608163)
- Wales, MA (2): Bridge replacement, W-02-002, Holland Road over Wales Brook (MassDot Project #608847)
- Hampden, MA: Bridge replacement, H-04-004, Rockadundee Bridge over Scantic River (MassDot Project #610779)
- Monson, MA: Bridge replacement, M-27-015, Old Wales Road over Conant Brook (MassDot Project #608846)
- Leverett, MA: Bridge replacement, L-09-003, Millers Road over Roaring Brook (MassDot Project #608849)
- Ludlow, MA: Bridge replacement, L-16-026, Piney Lane over Broad Brook (MassDot Project #609120)
- Hubbardston, MA: Bridge replacement, H-24-003, Williamsville Road over the Burnshirt River (MassDot Project #609187)
- Longmeadow, MA: Blueberry Hill Elementary School improvements (SRTS) (MassDot Project #609517)
- Andover, MA: Bridge rehabilitation – A-09-036, I-495 over 28 (SB); A-09-037, I-495 over B&M and MBTA; A-09-041, I-495 over 28 (NB) (MassDot Project #606522)
- Hamilton-Ipswich, MA: Superstructure replacement, H-03-002, I-01-006, Winthrop Street over Ipswich River (MassDot Project #609467)
- Wellfleet, MA: Intersection improvements and related work at Route 6 and Main Street (MassDot Project #607397)
- Cohasset, MA: Corridor improvements and related work on Justice Cushing Highway (Route 3a) from Beechwood Street to Henry Turner Bailey Road (MassDot Project #608007)

- North Andover, MA: Corridor improvements on Route 114 between Waverly Road & Willow/Mill Street (MassDot Project #608095)
- Beverly, MA: Reconstruction of Bridge Street (MassDot Project #608348)
- Middleton, MA: Bridge replacement, M-20-003, Route 62 (Maple Street) over Ipswich River (MassDot Project #608522)
- Provincetown, MA: Corridor improvements and related work on Shank Painter Road, from Route 6 to Bradford Street (MassDot Project #608744)
- Lawrence, MA: Lawrence Manchester Rail Corridor (LMRC) rail trail (MassDot Project #608930)
- Peabody, MA: Independence Greenway extension (MassDot Project #609211)

This study plan describes the proposed methods and level of effort for the acoustic survey to be conducted at each of the 20 project areas to determine the presence or probable absence of breeding populations of NLEB at each area using the methods described in the U.S. Fish and Wildlife Service's (USFWS) *March 2022 Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines* (USFWS Guidelines).[1] Although acoustic surveys will focus on detecting NLEB, bat detectors are designed to detect all bats vocalizing in the vicinity of the detectors. Therefore, additional listed bat species may be detected during surveys, including eastern small-footed bat (*Myotis leibii*; state-listed endangered), little brown bat (*M. lucifugus*; state-listed endangered), and tricolored bat (*Perimyotis subflavus*; state-listed endangered). Though the federally endangered Indiana bat (*Myotis sodalis*) is also listed as state-endangered in Massachusetts, the state occurs outside the known range of this species. Therefore, Stantec does not believe that this species occurs within the project areas and Indiana bat will not be included in acoustic analysis at these projects. The goal of the study is to assess if NLEB are utilizing potential habitat along each project location during the 2022 summer maternity season.

In addition to acoustic surveys, MassDOT has requested Stantec conduct bridge assessments for all projects involving bridge work, including bridge replacement, rehabilitation, and preservation. For bridge projects that do not require tree clearing (i.e., preservation projects), Stantec will conduct bridge assessments only, and no acoustic surveys. Bridge projects that meet this criteria include the following:

- Oxford, MA: Structural steel cleaning, painting, and various repairs of overhead bridges on I-395: O-06-033, O-06-034, O-06-035, and O-06-040
- Tewksbury, MA: Bridge preservation of T-03-014, I-495 over Route 133, and T-03-015, I-495 over route 38

[1] United States Fish and Wildlife Service (USFWS). 2022. Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines. March 2020.

2.0 SURVEY METHODS

2.1 DESKTOP ANALYSIS

Stantec conducted a desktop review of each project area to estimate the need and level of effort for acoustic surveys and/or bridge assessments. As outlined in the USFWS Guidelines, bridges and other human-made structures can provide artificial roosting habitat for NLEB, although acoustic detectors are to be placed at least 15 meters (m) from bridges when conducting acoustic presence/absence surveys. The USFWS Guidelines also indicate that projects less than 1 kilometer (km) in length should be considered non-linear, which would require 14 detector-nights and at least 2 survey sites no less than 200 m apart. Based on recent correspondence between MassDOT and the USFWS,[2] Stantec will include portions of the linear road corridors on either side of the bridges to be assessed (up to 1 km survey envelope total) in our survey to categorize the projects as linear and to allow for greater flexibility in acoustic detector placement. Stantec will consider all projects as linear projects and will allocate 4 detector-nights of survey per km per USFWS Guidelines. Figures for these project locations and proposed detector placements are included in Appendix A.

2.2 FIELD SURVEYS

2.2.1 Acoustic Surveys

Stantec will conduct the acoustic surveys at each study area within the USFWS approved survey dates (15 May–15 August) in 2022. Per the minimum survey efforts outlined in the USFWS Guidelines: Phase 2 Acoustic Surveys for linear projects, 4 detector-nights per km of suitable summer habitat that may be impacted are required for each study area. Finally, for the purposes of this study plan, Stantec has conservatively assumed that non-excluded forested areas immediately adjacent to each linear area provide potential roost habitat for NLEB (suitable summer habitat) and may potentially be cleared during project construction. Therefore, Stantec has determined the following level of effort for each project based on the amount of linear tree clearing.

Central Massachusetts Sites (Group 1):

- Orange, MA: (0.795 km of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)
- West Brookfield, MA: (2.89 km [round up to 3.0 km] of potential tree clearing), 12 detector-nights (3 detectors deployed for 4 nights each)
- Oxford, MA: (no potential tree clearing, work at four bridges), bridge assessments only
- Wales, MA (1): (1.89 km [round up to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)

[2] MassDOT Technical Memorandum to Susi Van Oettingen, USFWS. Re: NLEB Survey Protocol for Small Projects and Bridges. June 6, 2022. 2pp.

- Wales, MA (2): (0.212 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Hampden, MA: (0.122 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Monson, MA: (0.143 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Leverett, MA: (0.05 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Ludlow, MA: (0.137 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Hubbardston, MA: (0.195 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Longmeadow, MA: (0.673 km of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)

Eastern Massachusetts Sites (Group 2):

- Tewksbury, MA: (no potential tree clearing, work at two bridges), bridge assessments only
- Andover, MA: (0.792 km of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)
- Hamilton-Ipswich, MA: (0.145 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Wellfleet, MA: (1.02 km of potential tree-clearing), 4 detector-nights (1 detector deployed for 4 nights)
- Cohasset, MA: (1.54 km [round up to 2.0 km] of potential tree-clearing), 8 detector-nights (2 detectors deployed for 4 nights each)
- North Andover, MA: (3.64 km [round up to 4.0 km] of potential tree-clearing), 16 detector-nights (4 detectors deployed for 4 nights each)
- Beverly, MA: (2.05 km [round down to 0.13 km] of potential tree clearing), 4 detector-nights (1 detector deployed for 4 nights)
- Middleton, MA: (0.102 km of potential tree clearing, expanded project to 1 km survey envelope), 4 detector-nights (1 detector deployed for 4 nights)
- Provincetown, MA: (2.32 km [round down to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)
- Lawrence, MA: (2.59 km [round down to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)
- Peabody, MA: (1.83 km [round up to 2.0 km] of potential tree clearing), 8 detector-nights (2 detectors deployed for 4 nights each)

Based on this proposed level of effort, Stantec will deploy a total of 13 detectors (52 detector-nights) at Central Massachusetts sites and 17 detectors (68 detector-nights) at Eastern Massachusetts sites. Biologists will complete initial deployment in 2 days per site group (Days 1 and 2). Biologists will then retrieve all detectors over the course of 2 days per site group (Days 5 and 6) upon meeting the USFWS-required number of detector-nights under suitable weather conditions. This strategy of detector mobilization and demobilization assumes that nightly weather conditions remain appropriate during each night of survey according to USFWS Guidelines. If weather conditions do not meet USFWS Guidelines (e.g., 30 or more minutes of rain, excessive wind, and/or cold temperatures), additional day(s) will be required.

Stantec will use full-spectrum (e.g., Wildlife Acoustics© SM4BAT-FS) acoustic bat detectors for the surveys. Each detector will be fitted with an SMM-U1 or SMM-U2 ultrasonic omnidirectional microphone. Stantec will deploy detectors according to the criteria in the USFWS Guidelines, positioning detectors in potential flight corridors that could provide suitable NLEB foraging habitat. As USFWS Guidelines recommend, microphones will be deployed in areas without vegetation or with minimal vegetation within 10 m of the microphone, obstructions will be located at least 3 m away from microphones in any direction, and detectors will be placed at least 200 m apart.

Based on review of aerial imagery during the initial desktop analysis and assuming access to the right-of-way (ROW) associated with each area, Stantec has identified proposed detector locations for each project (Appendix A; Figures 1–22). The proposed locations along the edge of the ROW and adjacent to tree clearing areas are spread out across each area to target either large segments of forest or forested areas near a wetland, field, or bridge. Final detector deployment will be determined by the biologist in the field and is also subject to landowner permission and access. In areas without landowner permission or suitable access, final detector placement will be in the closest appropriate location within a town, municipal, or state ROW depending on the project. Final detector locations will also be based on a field assessment, following criteria in the USFWS Guidelines. Stantec will record coordinates of the final detector locations using a GPS unit, document the approximate accuracy of the location, and photograph each detector to show scale (e.g., include a vehicle or person in the photo) and the surrounding habitat and the “detector-view." For each detector site, Stantec will document relevant deployment and habitat information on a Stantec field datasheet and on the USFWS Guidelines Appendix A Phase 1 Summer Habitat Assessments datasheet (Appendix B).

Stantec will mount each detector so that the microphone is approximately 3 m above ground level and oriented horizontally to the ground to sample an optimal volume of air space in accordance with the USFWS Guidelines. Stantec will set the audio and data storage settings on each detector according to defaults recommended by the manufacturer (e.g., detectors will operate in “triggered .wav” mode using default trigger threshold settings recommended by the manufacturer). Stantec will program each detector to record from 30 minutes before sunset until 30 minutes after sunrise and will power each detector with alkaline batteries.

Stantec will leave detectors in place at each survey site until at least 4 calendar nights have been successfully surveyed during weather conditions that meet the parameters outlined in the USFWS Guidelines:

- Temperatures remain above 50° F during the first 5 hours of each survey night;
- Precipitation/fog persists for no more than 30 minutes during the first 5 hours of each survey night; and
- Sustained wind speeds do not exceed 9 miles/hour for 30 minutes or more during the first 5 hours of each survey night.

Stantec will verify weather conditions by reviewing hourly data recorded at the nearest weather station to each detector site, accessed online via Weather Underground (www.wunderground.com). Stantec will record the weather station ID for each station used on the corresponding field datasheet. Following the first four weather-appropriate nights of data collection, Stantec will inspect each detector as soon as practicable in the field to confirm that each operated for 4 nights (i.e., check battery voltage, verify presence of recorded files, and view system status log files). Once confirmed, Stantec will remove the detectors from the field. Stantec will analyze only those data from the first 4 nights that meet the weather criteria.

2.2.2 Bridge Assessments

To determine if bat species are using bridges, bridge assessments will be conducted at each bridge following the guidance available in the User's Guide for the *Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat*, version 5.0. Biologists will document favorable characteristics of bridges that support bats, including cracks in concrete, expansion joints, dark cave-like environments, and presence of waterbodies. Surveys will also include visual assessments to determine the presence of flying or roosting bats, guano, and staining on concrete, and auditory assessments for high-pitched squeaking or chirping. Biologists will use a flashlight or headlamp and may use binoculars when viewing higher areas. If a bridge assessment is not feasible due to safety or access issues (e.g., due to bridge height, traffic volume, fencing, or other safety considerations), the viability of following the non-linear project survey effort for these projects (e.g., 2 detectors deployed for a combined 14 detector-nights) will be discussed with MassDOT. For each bridge location, biologists will complete the USFWS Bridge/Structure Bat Assessment Form (Appendix C).

3.0 ANALYSIS

Stantec bat biologists will perform a coarse visual analysis of the data to confirm that high frequency bat calls were recorded; if so, Stantec will then analyze data using Kaleidoscope Pro Software version 5.4.1 or newer (Kaleidoscope),[3] with classifier version 5.4.0 using a "0" sensitivity setting and by selecting for the Massachusetts region. This analysis method has been approved by the USFWS as suitable for analyzing full-spectrum bat data collected by SM4 units once the data have been converted to zero-

[3] https://www.wildlifeacoustics.com/release-notes/kaleidoscope-pro

crossing format. Stantec will base presence or probable absence of NLEB on the maximum likelihood estimate (MLE) generated by Kaleidoscope for each night. An MLE of less than 0.05 indicates probable presence and an MLE greater than 0.05 indicates probable absence. Original full-spectrum and converted zero-crossing data files will be archived electronically and made available upon request.

Stantec will manually inspect each file recorded for each detector site/night that Kaleidoscope calculates probable presence (an MLE of less than 0.05) for NLEB. Stantec will also visually inspect each high frequency call sequence recorded by detectors, thereby manually vetting all high frequency call identification determinations (or lack of identification) made by Kaleidoscope. Though acoustic surveys will primarily focus on detecting NLEB and other high frequency species, calls from all bat species will be analyzed by the software and manually inspected. Stantec biologists with relevant experience and training in acoustic bat identification will conduct the manual vetting. Credentials and experience of biologists performing the manual vetting will be indicated in the survey report and are included in Appendix D.

4.0 REPORTING

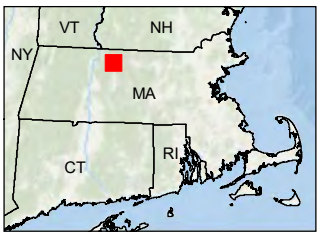
As requested by MassDOT, Stantec will prepare a single report for each project area describing the methods and results of the acoustic surveys as soon as possible after field work to ensure MassDOT meets their targeted transmittal to USFWS in late fall 2022. Each report will include completed Stantec and USFWS datasheets for the detector sites, maps showing the locations of each detector site, photos of the detector setups, screenshots of representative listed bat species' calls identified during analysis, tables summarizing the output from Kaleidoscope for all species identified, results of manual vetting, the resume of the biologist who conducted the manual vetting, the USFWS R5 Bat Reporting Form, and other information required by the USFWS Guidelines. Associated Geographic Information System (GIS) data, original acoustic data, status or log files, and software output will be retained and made available upon request. Stantec will also provide MassDOT with the results of the survey in excel format based on the 2022 MassDOT Bat Survey Consultant format. Additionally, Stantec will format acoustic data into a template suitable for inclusion into the North American Bat Monitoring Program database.

In addition, and as requested by MassDOT, Stantec will prepare a separate memo for each bridge site describing the methods and results of the bridge assessments as soon as possible after field work. Each memo will include maps showing the locations of the bridge sites, photos of the bridge characteristics and the completed USFWS Bridge/Structure Bat Assessment Form. As requested by MassDOT, memos will be submitted at least 15 days prior to the advertising date per project to allow for the minimal clearance time of 14 days. The memo for the Oxford project will be treated as higher priority because this project's advertising date has been moved up to July 9, 2022.

APPENDICES

APPENDIX A PROPOSED SURVEY LOCATION MAPS





Legend

- Proposed Acoustic Survey Location
- Project Area

0 420 Feet

(At original document size of 8.5x11)
1:5,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Orange, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

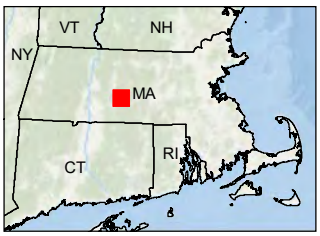
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Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Orange

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Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.





Legend

- Proposed Acoustic Survey Location
- Project Area

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(At original document size of 8.5x11)
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N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
West Brookfield, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

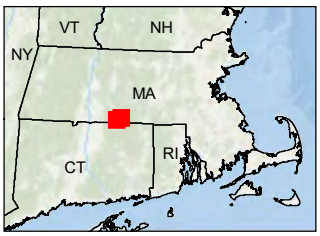
Figure No.
2

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – West Brookfield

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 1,500 Feet

(At original document size of 8.5x11)
1:18,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Wales, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

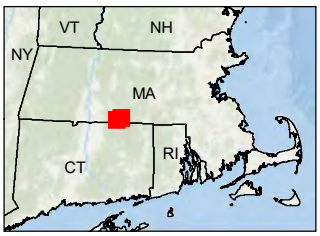
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Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Wales 1

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Wales, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

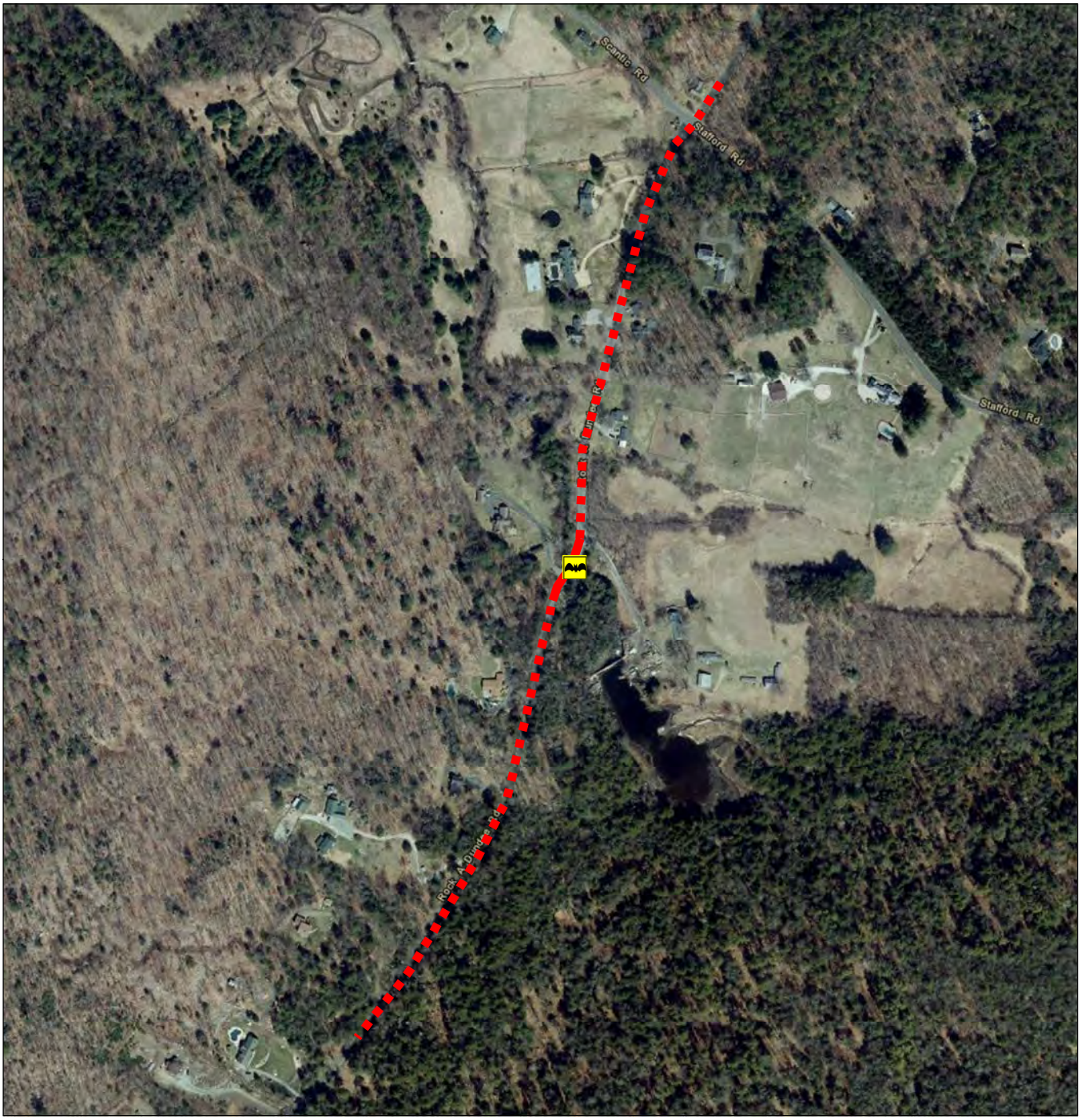
Client/Project
179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

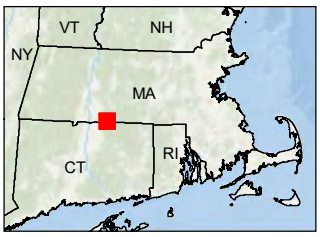
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Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Wales 2

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Hampden, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

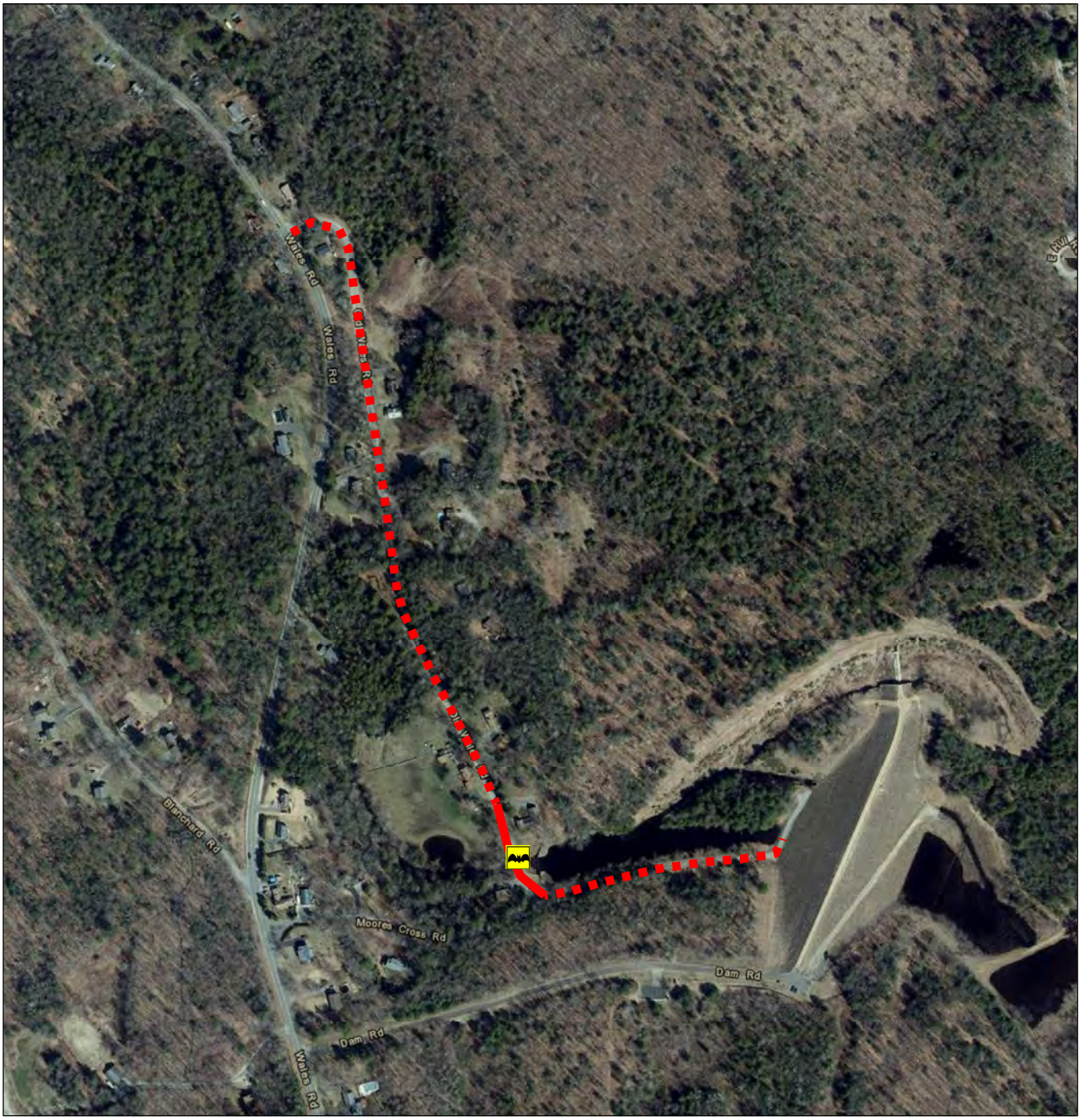
Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

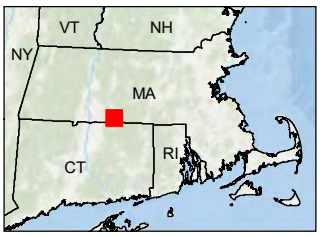
Figure No.
5

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Hampden

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Monson, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

179410726

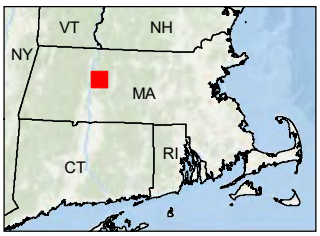
Figure No.
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Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Monson

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 300 Feet

(At original document size of 8.5x11)
1:3,600

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Leverett, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project
179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

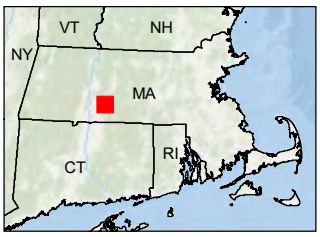
Figure No.
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Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Leverett

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Stantec

Project Location
Ludlow, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

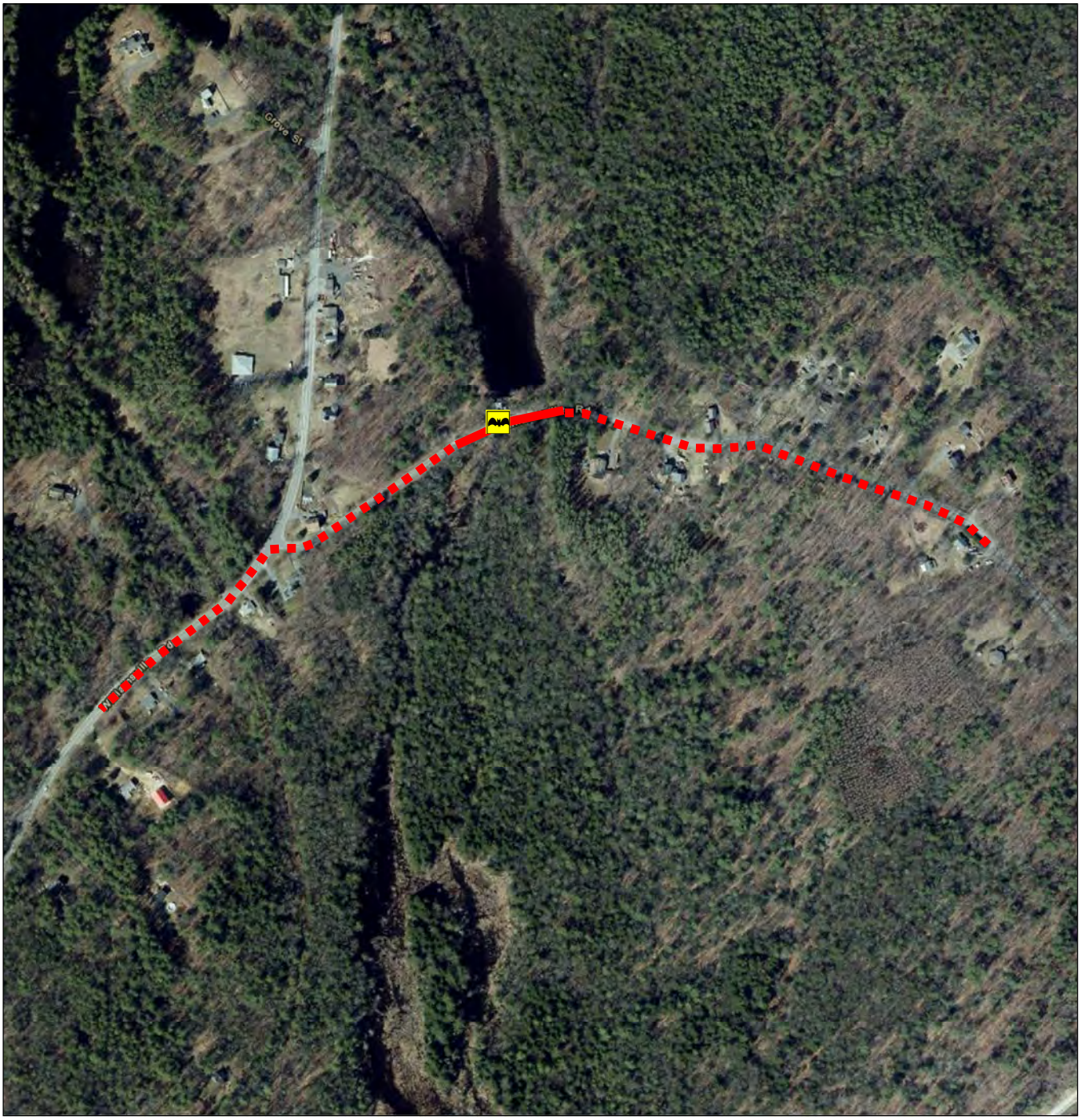
Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

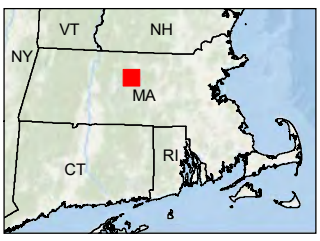
Figure No.
8

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Ludlow

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Stantec

Project Location
Hubbardston, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

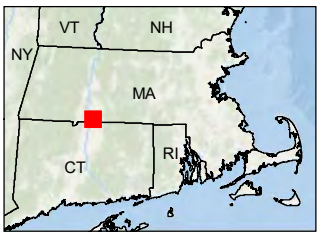
Figure No.
9

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Hubbardston

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 300 Feet

(At original document size of 8.5x11)
1:3,600

N

Stantec

Project Location
Longmeadow, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

Figure No.
10

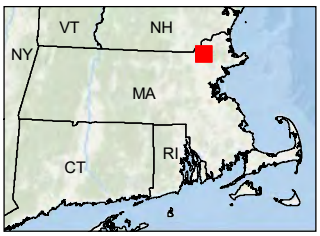
Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Longmeadow

Notes
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 800 Feet

(At original document size of 8.5x11)
1:9,600

N

Stantec

Project Location
Andover, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

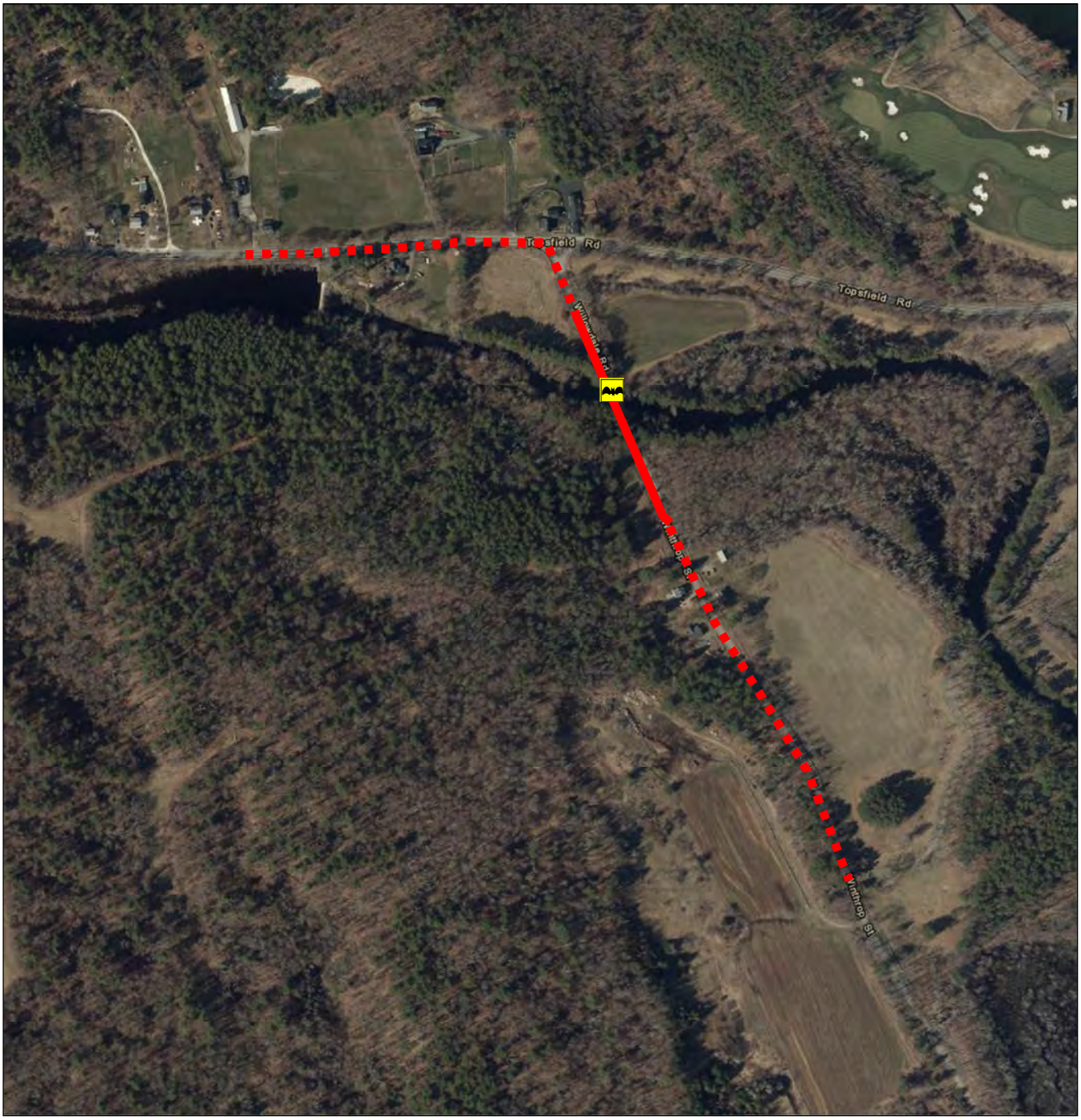
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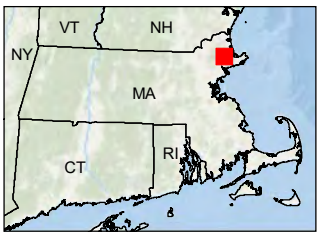
Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Andover

Notes
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Stantec

Project Location
Hamilton-Ipswich, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project
179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

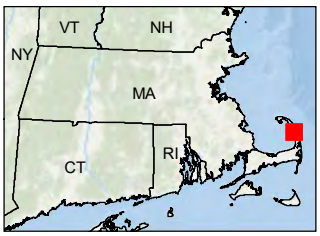
Figure No.
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Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Hamilton-Ipswich

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Wellfleet, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

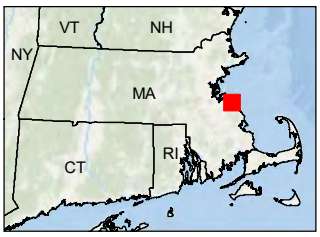
Figure No.
13

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Wellfleet

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 600 Feet

(At original document size of 8.5x11)
1:7,200

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Cohasset, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

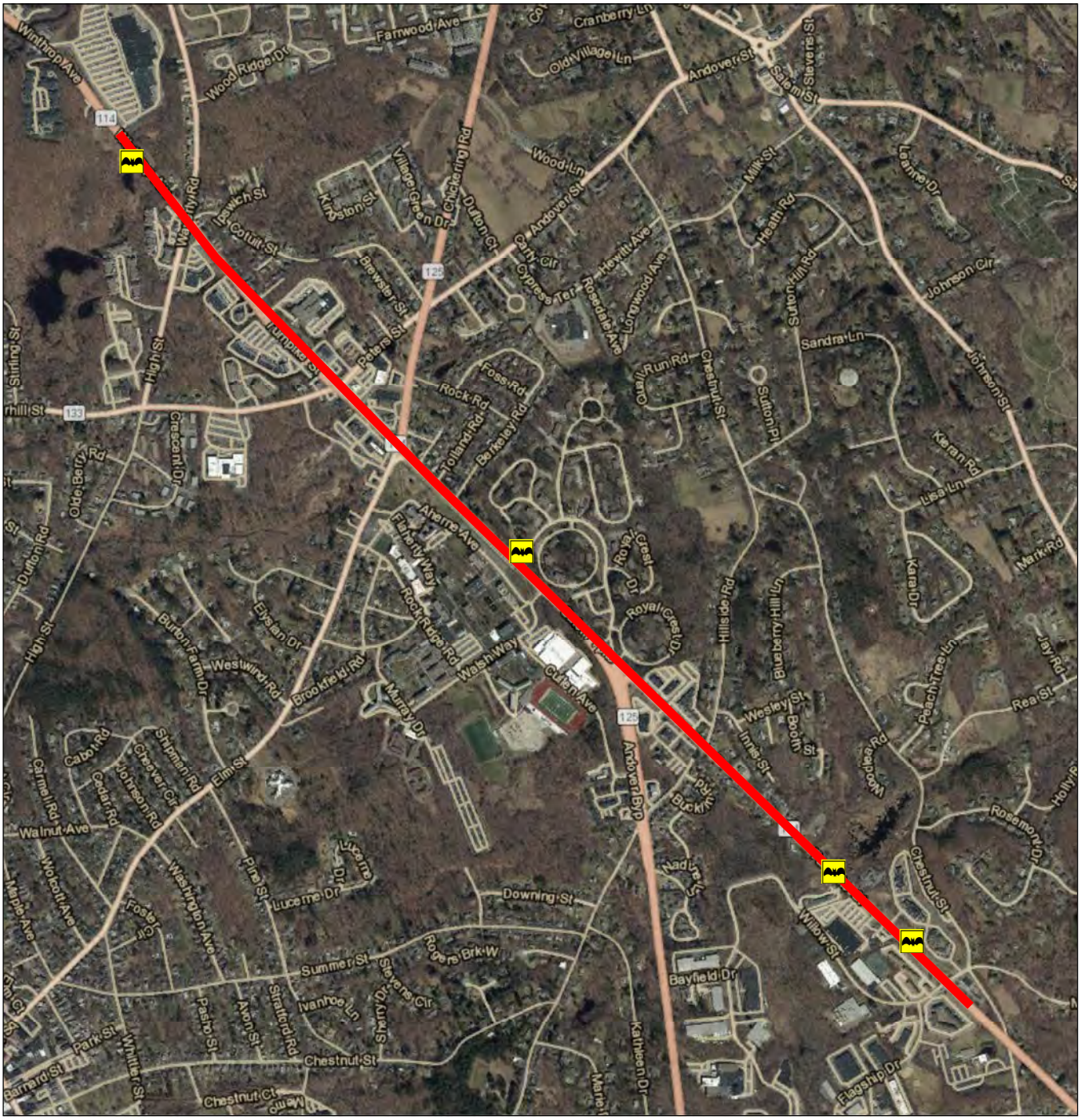
Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

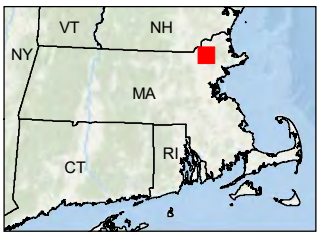
Figure No.
14

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Cohasset

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 1,500 Feet

(At original document size of 8.5x11)
1:18,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
North Andover, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

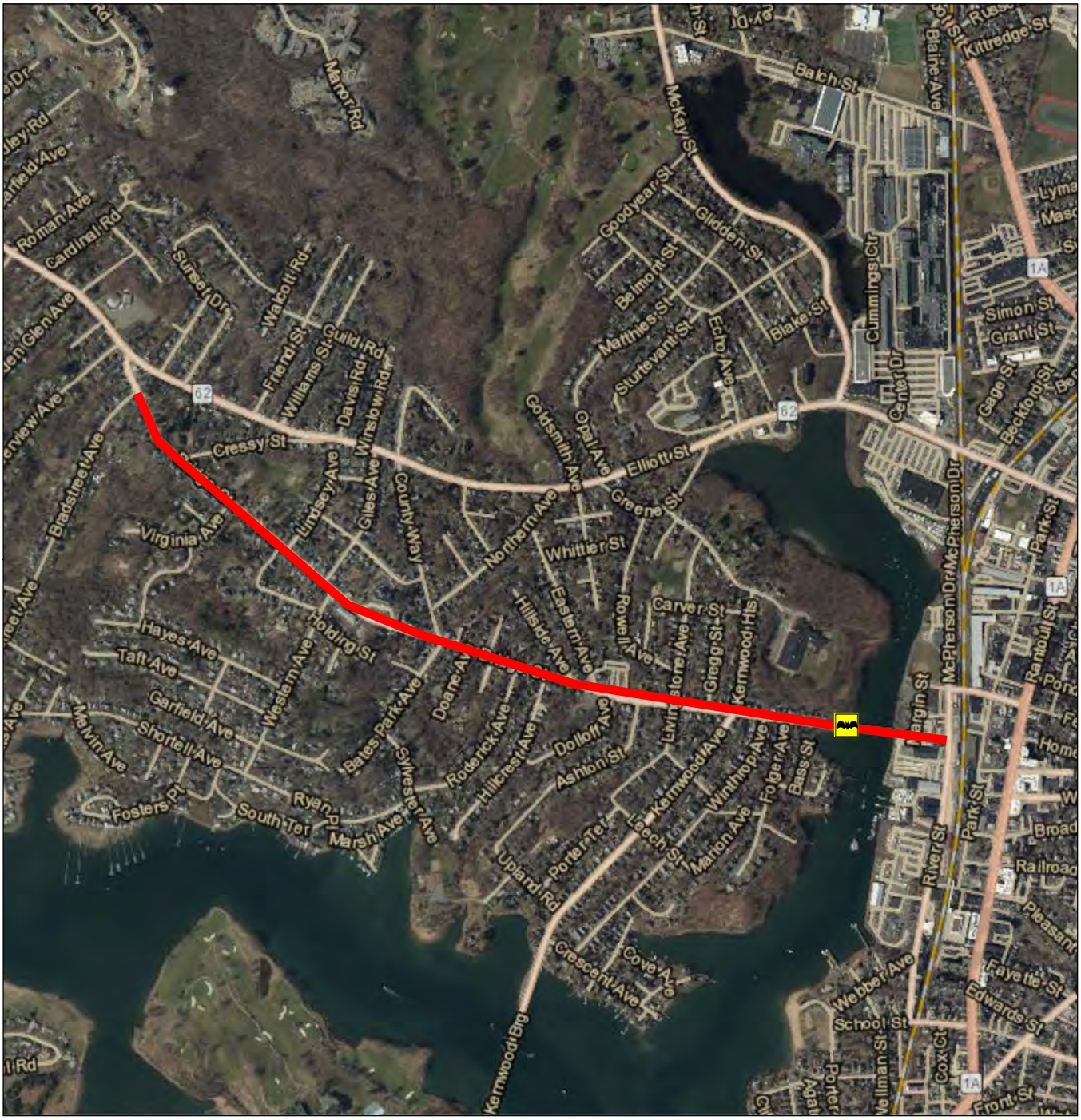
Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

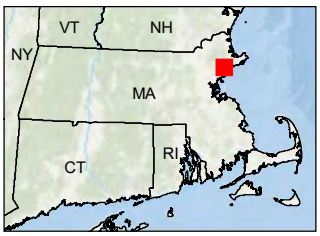
Figure No.
15

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – North Andover

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 1,200 Feet

(At original document size of 8.5x11)
1:14,400

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Beverly, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

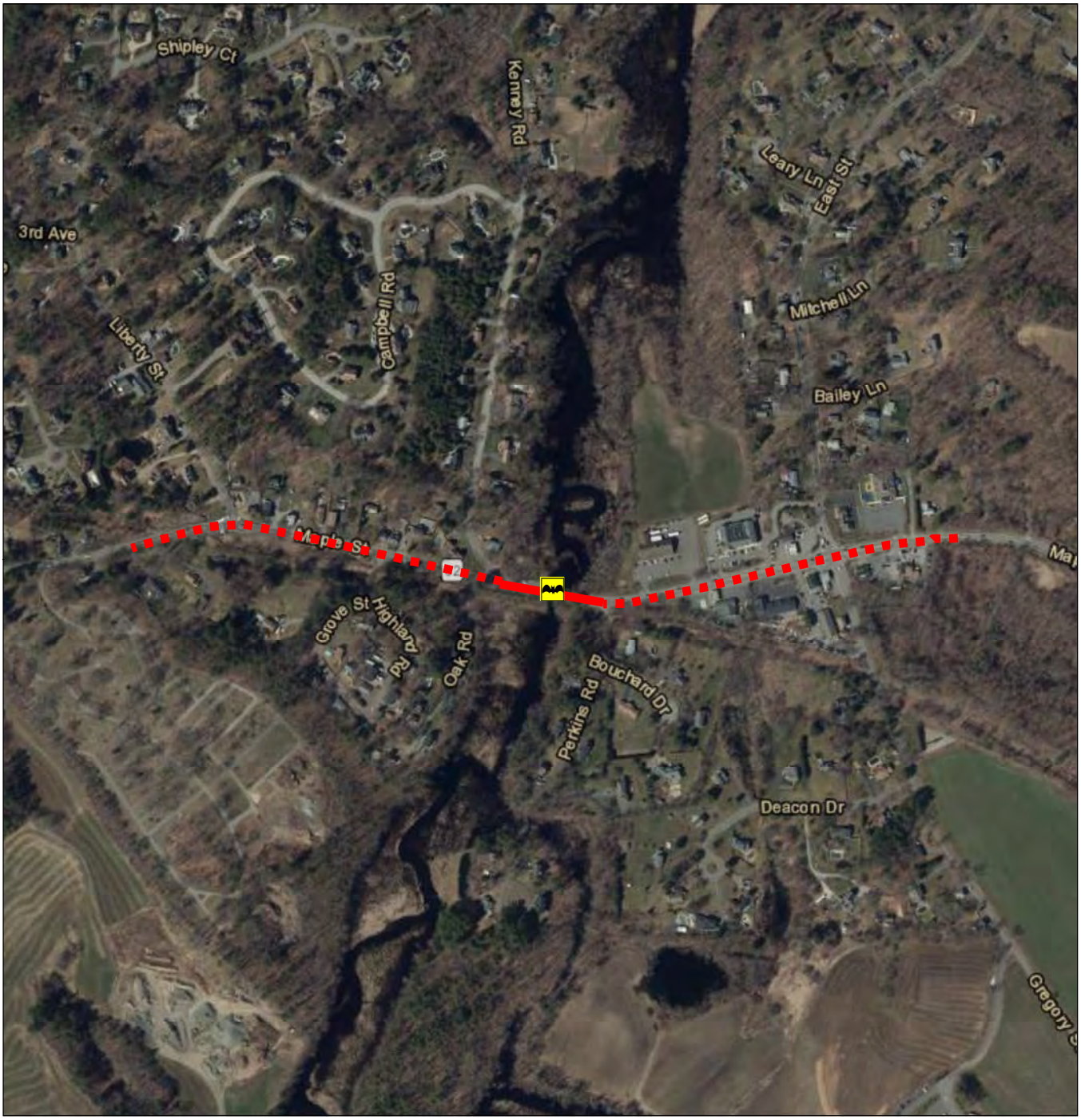
Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

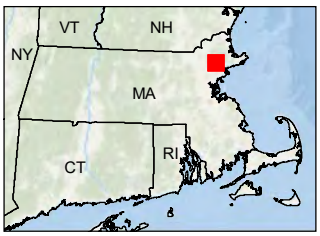
Figure No.
16

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Beverly

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Legend

- Proposed Acoustic Survey Location
- Project Area
- Expanded Project Area

0 600 Feet

(At original document size of 8.5x11)
1:7,200

N

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Stantec

Project Location
Middleton, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

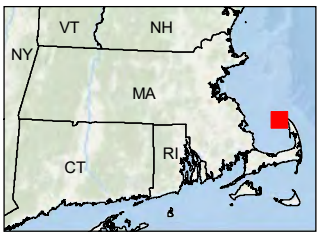
Figure No.
17

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Middleton

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 1,000 Feet

(At original document size of 8.5x11)
1:12,000

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Provincetown, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

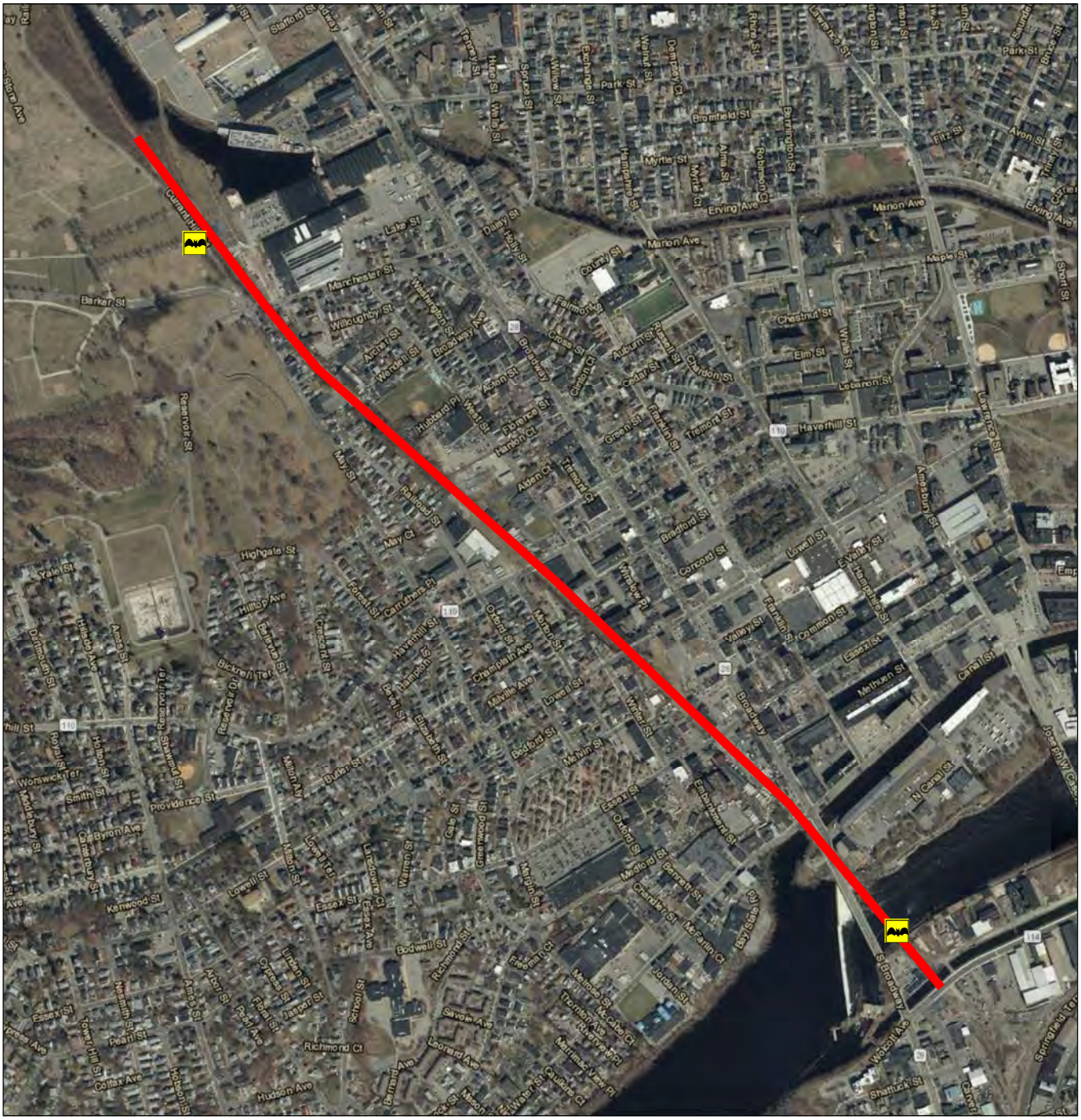
Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

Figure No.
18

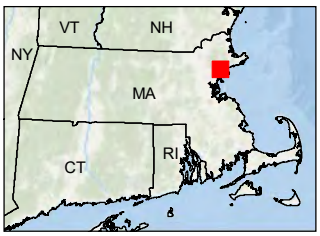
Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Provincetown

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Cumberland Hill
Barker St
Reservoir St
Manchester St
Willoughby St
Broadway
Haverhill St
Lowell St
Essex St
Canal St
Merrimack St
Bradford St
Concord St
Elm St
Chestnut St
Marion Ave
Maple St
Park St
Bromfield St
Erving Ave
Lake St
Dalay St
Hollis St
Water St
Spruce St
Willow St
Exchange St
Walnut St
Depot Ct
Myrtle St
Alma St
Robinson Ct
Fitz St
Avon St
Thiery St
Sherif St
Lawrence St
Union St
Amesbury St
Valley St
Methuen St
Broadway
Jackson St
Auburn St
Russell St
Cedar St
Charlton St
Green St
Franklin St
Tremont St
Hubbard Pl
West St
Florence St
Hanlon Ct
Aiden Ct
Tremont Ct
May St
May Ct
Railroad St
Highgate St
Yale St
Hillside Ave
Forest St
Carruthers Pl
Crescent St
Haverhill St
Orchard St
Hampton St
Champlain Ave
Melvin Ave
Marston St
Winter St
Bedford St
Elizabeth St
Butler St
Millvin Ave
Providence St
Smith St
Wentworth Ter
Reservoir Ter
Bickness Ter
Reservoir Dr
Dorchester St
Hillside Ave
Royal St
Hobart St
Ames St
Hilldale Ave
Kenwood St
Lowell St
Essex St
Bodwell St
Richmond St
Richmond Ct
Freeman Ct
Jordan St
Melrose St
McCabe Ct
Merrimack View Pl
Leonard Ave
Savoie Ave
Barnard Ave
Hudson Ave
Collax Ave
Pearl St
Jasper St
Cypress St
Linden St
Abbot St
Ames St
School St
Tower Hill St
Hobson St
Shattuck St
Watson Ave
Springfield Ter
Carver St
Oxford St
Medford St
Bennett St
Chandler St
McFarlin Ct
Easy St
Emerson Ave
Emerson Ct
Gage St
Greenwood St
Warren St
Lindenwood Ct
Lowell Ter
Milton St
Milton Ave
Butler St
Wilmot St
Methuen St
Canal St
N Canal St
Joseph W Cas
Essex St
Exchange St
Railroad St
Water St
Mason St
Crombie St
Merrimack View Pl
Riverview Pl
Emp
Lowell St
Valley St
Franklin St
Common St
Essex St
Methuen St
Canal St
Broadway
Haverhill St
Lowell St
Essex St
Bodwell St
Richmond St
Richmond





Legend

- Proposed Acoustic Survey Location
- Project Area

0 600 Feet

(At original document size of 8.5x11)
1:7,200

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Project Location
Peabody, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

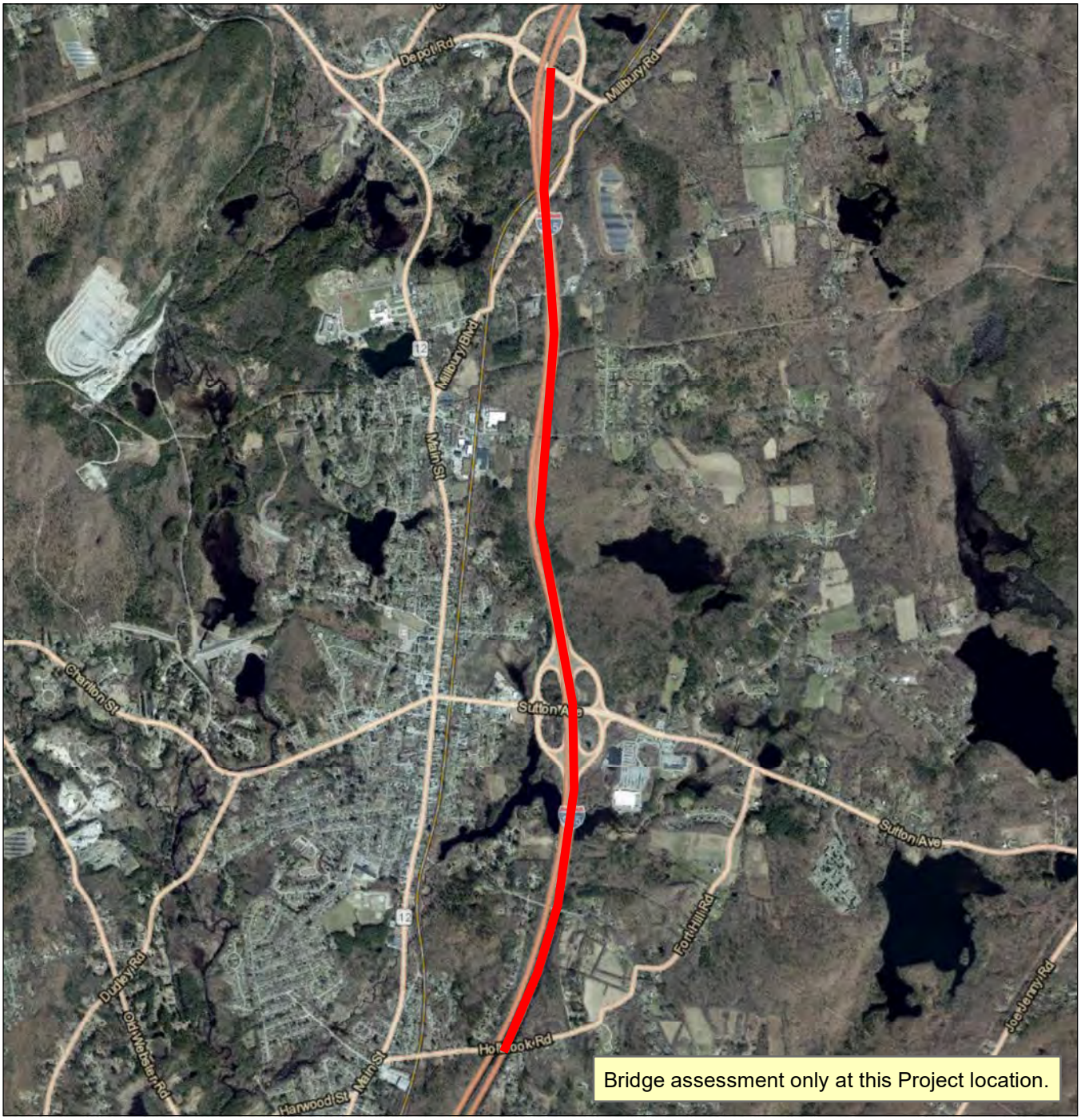
Client/Project
179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

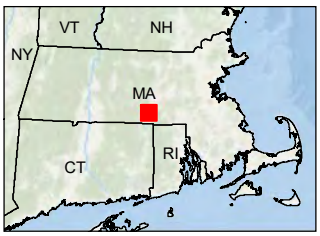
Figure No.
20

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Peabody

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Legend

- Proposed Acoustic Survey Location
- Project Area

0 3,000 Feet

(At original document size of 8.5x11)
1:36,000

N

Stantec

Project Location
Oxford, Massachusetts

Prepared by MM on 2022-06-14
TR by KWH on 2022-06-20
IR Review by LJ on 2022-06-20

Client/Project 179410726
Massachusetts Department of Transportation
Northern Long-eared Bat Acoustic Survey

Figure No.
21

Title
Northern Long-eared Bat Acoustic Survey
Proposed Location – Oxford

Notes
1. Coordinate System: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet
2. Data Sources: MassDOT, Stantec
3. Background: Massachusetts 2021 MassGIS Color Orthoimagery

Citrix V:\1956\Active_Task Owner and other Non-BC\1956 Jobs\179410726\03_data\gis_cad\gis\mxds\179410726_DetectorsStudyPlan.mxd Revised: 2022-06-20 By: memason

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Bridge assessment only at this Project location.
Andover St
River Rd
Clark Rd
Main St
Dock Rd
Old Boston Rd
Highland View Rd
Ridolfi Dr
Hillman St
Apple Hill Dr
Northgate Rd
Prospect Hill Dr
Maplewood Rd
Bailey Rd
Penney Ln
Dearing Dr
Sunnyside Ave
Floyd Ave
Dickson Ave
Eastern Ave
Village St
Windward Rd
Longmeadow Dr
Danielle Dr
Trull Rd
Hood Rd
Cooley Rd
Scotland Rd
Woodcrest Dr
Marion Dr
Louey Rd
Lagoulis Rd
Carmen Rd
Canyon Rd
Westland Dr
Irvington St
Juniper Ln
Randolph Dr
Emerald Ct
Power Company Rd
Carlisle Ave
Applegate Rd
Seneca Rd
Kennedy Rd
Nolin St
Astle St
French St
Sesame St
Meadow Rd
Merlin Dr
Oak Hill Ave
Little Oak Ave
Dell St
Joslin Dr
Pine St
Nashua Rd
Foxrun Cir
Ridolfi Dr
Ames Hill Dr
Helen Mansion Dr
Riddick Rd
Deering Dr
Highwood Dr
Bellehaven Dr
Berkeley Ln
Wellington Cir
Glenlo Way
Boyce Ct
Starr Ave E
Marsh Hill Dr
Nashua Meadows Ln
Florence St
Wilmington St
Burnham Rd
Fellemonon Ave
Virginia Ave
Holland Ave
Agnes Rd
Edgewood St
Main St
Adams Ter
Julian St
Arnold St
Miriam Ln
Wayside Ln
Country Club Dr
Lexington St
Oak Hill Dr
Trull Brook Ln
Chapin Ln
Great Rd
Cabot St
Longmeadow Rd
Danielle Dr
Strathdon Ln
Greenmeadow Dr
Finale Ln
Ward St
Poland Ave
Trull Rd
Sawyer Ln
Scotland Rd
Woodcrest Dr
Maplewood Rd
Penney Ln
Chivas Cir
Brook Path
Nashua Meadows Ln
Florence St
Wilmington St
Burnham Rd
Fellemonon Ave
Virginia Ave
Holland Ave
Agnes Rd
Edgewood St
Main St
Adams Ter
Julian St
Arnold St
Miriam Ln
Wayside Ln
Country Club Dr
Lexington St
Windward Rd
Longmeadow Dr
Danielle Dr
Trull Rd
Hood Rd
Cooley Rd
Cabot St
Chapin Ln
Great Rd
Trull Brook Ln
Sawyer Ln
Scotland Rd
Woodcrest Dr
Maplewood Rd
Penney Ln
Chivas Cir
Brook Path
Nashua Meadows Ln
Merlin Dr
Oak Hill Ave
Little Oak Ave
Dell St
Joslin Dr
Pine St
Nashua Rd
Foxrun Cir
Ridolfi Dr
Ames Hill Dr
Helen Mansion Dr
Riddick Rd
Deering Dr
Highwood Dr
Bellehaven Dr
Berkeley Ln
Wellington Cir
Glenlo Way
Boyce Ct
Starr Ave E
Marsh Hill Dr
Nashua Meadows Ln
Florence St
Wilmington St
Burnham Rd
Fellemonon Ave
Virginia Ave
Holland Ave
Agnes Rd
Edgewood St
Main St
Adams Ter
Julian St
Arnold St
Miriam Ln
Wayside Ln
Country Club Dr
Lexington St
Windward Rd
Longmeadow Dr
Danielle Dr
Trull Rd
Hood Rd
Cooley Rd
Cabot St
Chapin Ln
Great Rd
Trull Brook Ln
Sawyer Ln
Scotland Rd
Woodcrest Dr
Maplewood Rd
Penney Ln
Chivas Cir
Brook Path

APPENDIX B STANTEC NLEB BAT PRESENCE/ABSENCE ACOUSTIC SURVEY DATASHEET AND USFWS PHASE 1 SUMMER HABITAT ASSESSMENTS DATASHEET

Stantec Ground-Based Acoustic Bat Detector Datasheet

Site ID:	Project Number:	Project Name:					
	State:	County:		Acoustic Survey Type			
Site Selector:	Lat:	Long:		Summer Acoustic			
Deployer:	Notes: NA						
Date Deployed:							
Deploy Duration:							
Detector #:							

Detector Setup

Detector Make:	**Detector Model:**	**Dist to Obstruct (m):**
Microphone Model:	**Directionality:**	**Mic Height (AGL; m):**
Weatherproofing:	**Mic Angle:**	**Call Data Type:**
Mic Direction (deg):	**In-Field Calibration:**	**Notes:**

HABITAT DESCRIPTION

VEGETATION CHARACTERISTICS

Habitat Type:

Canopy Closure (%):

Habitat Description:

Habitat Use:	

Habitat Notes:

STREAM CHARACTERISTICS

Est. Distance to Water Source (m):	
Type of Water:	

Detector Startup Notes:

Detector Startup:

Card In A:

Card In B:

Memory A:

Memory B:

Battery:

Temperature:

Mic 0:

Cal Ch 0:

Going to Sleep Until:

Additional Site Notes:

USFWS accepted answers:

Mic Angle: 0 = parallel to ground, 45 = angled up, 90 = straight up, 315 = angled down, 270 = pointed down

Habitat Type: creek/riparian, pond, mine portal, field edge, bottomland forest, cave entrance, bridge, open field, upland forest, structure, other

If collecting data on paper, please add site diagram to back.

BAT HABITAT ASSESSMENT DATASHEET

Project Name:_____ Date:_____

Township/Range/Section:_____

Lat Long/UTM/ Zone:_____ Surveyor:_____

Brief Project Description

Project Area

	Total Acres	Forest Acres	Open Acres
Project			

	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
Proposed Tree Removal (ac)			

Vegetation Cover Types

Pre-Project	Post-Project

Landscape within 5 mile radius

Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): _____

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (>50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
Dominant Species of Mature Trees				
% Trees w/ Exfoliating Bark				
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
No. of Suitable Snags				

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable

IS THE HABITAT SUITABLE FOR INDIANA BATS? _____

IS THE HABITAT SUITABLE FOR NORTHERN LONG-EARED BATS? _____

Additional Comments:

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations: understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

APPENDIX C BRIDGE/STRUCTURE BAT ASSESSMENT FORM

APPENDIX D: Bridge/Structure Bat Assessment Form

Bridge/Structure Bat Assessment Form Instructions

- This form will be completed to document bat occupancy or bat use of bridges, culverts, and other structures. This form shall be submitted to the appropriate personnel within the DOT and USFWS for recordkeeping (or uploaded into the Information, Planning, and Consultation (IPaC) Determination Key for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat) prior to conducting: any activities below the deck surface either from the underside or from above the deck surface that bore down to the underside; any activities that could impact expansion joints; any activities involving deck removal on bridges; or any activities involving structure demolition for bridges, culverts, and/or other structures.
- Assessments must be completed within two (2) years of conducting any work (see the above bullet), regardless of whether assessments have been conducted in the past. Assessments must be completed in appropriate weather conditions, suitable for the assessor to observe common signs of bat use.
- Evidence of bat use may include visual observation (live and/or dead), presence of guano, presence of staining, audible observation, and/or odor observation. Presence of one or more indicators is sufficient evidence that bats may be using the bridge, culvert, and/or other structure.
- If bat use of a bridge, culvert, and/or other structure is noted, additional studies may be undertaken during bat active season to identify the specific bat species utilizing the structure, or protected bat species presence can be assumed, in order to comply with threatened and endangered species regulations. Bat active season dates, typically between April and November, vary regionally and by species, so assessors should consult with their local USFWS Field Office for more specific active season dates.
- For use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat – If the bridge/structure is 1,000 feet or more from suitable bat habitat[1] (e.g., an urban or agricultural area without suitable foraging habitat or corridors linking the bridge to suitable foraging habitat), check the appropriate box and fill out the table below. **No further assessment is required.**

Date & Time of Assessment	**DOT Project #**	**Route/Facility Carried**	**County**
Federal Structure ID	**Structure Coordinates** (latitude and longitude)	☐ This bridge/structure is 1,000 feet or more from suitable bat habitat[2] Name:_____ Signature: _____	

- Any questions pertaining to assessments or this form should be directed to the local USFWS Field Office.

[1] Refer to the USFWS's summer survey guidance for the definition of suitable habitat (http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html).

[2] This condition is only for use of the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat

Date & Time of Assessment	DOT Project Number	Route/Facility Carried	County
Federal Structure ID	Structure Coordinates (latitude and longitude)	Structure Height (approximate)	Structure Length

Structure Type (check one)

Bridge Construction Style

- ○ Cast-in-place 
- ○ Pre-stressed Girder 
- ○ Flat Slab/Box 
- ○ Steel I-beam 
- ○ Truss 

- ○ Covered 
- ○ Parallel Box Beam 
- ○ Other:

Culvert Type

- ○ Box
- ○ Pipe/Round
- ○ Other:

Other Structure

- ○

Structure Material (check all that apply)

Deck Material	*Beam Material*	*End/Back Wall Material*
☐ Metal	☐ None	☐ Concrete
☐ Concrete	☐ Concrete	☐ Timber
☐ Timber	☐ Steel	☐ Stone/Masonry
☐ Open grid	☐ Timber	☐ Other:
☐ Other:	☐ Other:	

Culvert Material

- ☐ Metal
- ☐ Concrete
- ☐ Plastic
- ☐ Stone/Masonry
- ☐ Other:

Creosote Evidence

- ○ Yes ○ No
- ○ Unknown

Notes:

Crossings Traversed (check all that apply)

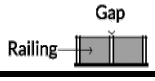
☐ Bare ground	☐ Open vegetation
☐ Rip-rap	☐ Closed vegetation
☐ Flowing water	☐ Railroad
☐ Standing water	☐ Road/trail - Type:
☐ Seasonal water	☐ Other:

Surrounding Habitat (check all that apply)

☐ Agricultural	☐ Grassland
☐ Commercial	☐ Ranching
☐ Residential-urban	☐ Riparian/wetland
☐ Residential-rural	☐ Mixed use
☐ Woodland/forested	☐ Other:

Areas Assessed (check all that apply)

Check all areas that apply. If an area is not present in the structure, check the "not present" box.
Document all bat indicators observed during the assessment. Include the species present, if known, and provide photo documentation as indicated.

Area (check if assessed)	**Assessment Notes**	**Evidence of Bats** (include photos if present)
☐ All crevices and cracks: **Bridges/culverts:** rough surfaces or imperfections in concrete **Other structures:** soffits, rafters, attic areas	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Concrete surfaces (open roosting on concrete)	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between concrete end walls and the bridge deck	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Crack between concrete railings on top of the bridge deck 	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Vertical surfaces on concrete I-beams	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Spaces between walls, ceiling joists	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ Weep holes, scupper drains, and inlets/pipes	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All guiderails	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species
☐ All expansion joints	☐ Not present	☐ Visual - live # dead # ☐ Guano ☐ Staining ☐ Audible ☐ Odor ☐ Photos ☐ Species

Name:	Signature:

APPENDIX D RESUME OF BIOLOGIST TO PERFORM MANUAL VETTING OF RARE SPECIES CALLS

Dr. Peterson is a senior wildlife biologist and project manager specializing in renewable energy projects, bird and bat migration, and rare species assessments. He focuses on solutions to quantify and manage turbine-related wildlife impacts at terrestrial and offshore commercial wind projects. Since joining the company in 2003, Trevor's project experience has included a wide range of wide range of wildlife surveys at proposed and existing wind projects, rare bat surveys, breeding bird surveys, raptor surveys, nocturnal radar surveys, vernal pool water quality and ecological monitoring, rare turtle telemetry and demographic studies, natural community characterization, and vegetation monitoring. He earned his PhD in Ecology and Environmental Sciences from the University of Maine for his research on the use of long-term acoustic bat data to study bat migration and predict and manage potential impacts from land-based and offshore wind projects. Before working at Stantec, Trevor worked seasonally for the National Park Service at Acadia National Park and Isle Royale National Park and as an island caretaker for the Maine Island Trail Association. Dr. Peterson serves as Stantec's technical lead for acoustic bat surveys, responsible for updating equipment, survey methods, and data analysis/reporting methods.

EDUCATION

PhD Ecology and Environmental Sciences , University of Maine, Orono, ME, 2020

McMillan Offshore Survival Training, Castine, Maine, 2016

AB, Biology/Environmental Studies, Summa cum Laude, Phi Beta Kappa, Bowdoin College, Brunswick, Maine, 2002

Semester Program in Costa Rica, Tropical Field Biology, Environmental Studies, and Spanish, Duke University, Durham, North Carolina, 2000

CERTIFICATIONS & TRAINING

CPR, AED, and Basic First Aid, Americian Safety & Health Institute, Topsham, ME, 2019

Habitat Conservation Plan Training, US Fish and Wildlife Service National Conservation Training Center, Shepherdstown, WV, 2010

MEMBERSHIPS

Member, Northeast Regional Migration Monitoring Network

Member, Northeast Bat Working Group

Member, The Wildlife Society, Maine, May 2011-present

PROJECT EXPERIENCE

RENEWABLE ENERGY, OFFSHORE

Block Island Offshore Wind Farm | Block Island, Rhode Island | 2018-Present | Senior Scientist

Regional Offshore Acoustic Bat Monitoring | Gulf of Maine, mid-Atlantic, Great lakes

Tracking Bats using Nanotag Telemetry in the Gulf of Maine

RENEWABLE ENERGY

Activity-based Informed Curtailment: Using Acoustics to Design and Validate Smart Curtailment at Wind Farms | 2019 - 2022 | Prinicipal Investigator

Avian and Bat Surveys at New Creek Wind Energy Project | Grant County, West Virginia

Avian and Bat Surveys at Laurel Mountain Wind Energy Project | Randolph and Barbour Counties, West Virginia

NATURAL RESOURCE SERVICES

Natural Community Surveys and Resource Inventory | Moosehead Lake Region, Maine

Spotted Turtle and Vernal Pool Monitoring on Greenbush Railroad | Southeastern Massachusetts

Indiana Bat and Rare Bird Surveys at Proposed Wind Energy Project | Jefferson and Oswego Counties, New York

Acoustic Bat Surveys: Proposed Road Corridors | Tennessee

PUBLICATIONS

Peterson, T.. *Predicting and managing risk to bats at commercial wind farms using acoustics. A dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy, University of Maine.*, 2020.

Pelletier, S.K., K.S. Omland, K.S. Watrous and T.S. Peterson, Information synthesis on the potential for bat interactions with offshore wind facilities - final report. *US Department of the Interior, Bureau of Ocean Energy Management, Headquarters. Herndon, Virginia. OCS Study BOEM 2013-01163. 119 pp*, 2013.

Hildt, S. and T. Peterson. Surveying the damage: tools and techniques. *Invited Presentation at the NRDA Short Course, University of Massachusetts*, 2014.

Peterson, T.S., S.K. Pelletier, S.A. Boyden, and K.S. Watrous. Offshore acoustic monitoring of bats in the Gulf of Maine. *Northeastern Naturalist 21(1): 86-107*, 2014.

Johnson, J.S., L.E. Dodd, J.D. Kiser, T.S. Peterson, and K.S. Watrous. Food Habits of Myotis leibii along a Forested Ridgetop in West Virginia. *Northeastern Naturalist 19(4): 665-672*, 2012.

Johnson, J.S., K.S. Watrous, G.J. Giumarro, T.S. Peterson, S.A. Boyden, and M.J. Lacki. Seasonal and geographic trends in acoustic detection of tree-roosting bats. *Acta Chiropterologica, 13(1): 157-168*, 2011.

Peterson, T.S., A. Uesugi, and J. Lichter. Tree recruitment limitation by introduced snowshoe hares, Lepus americanus, on Kent Island, New Brunswick. *Canadian Field Naturalist 119 (4). 569-572*, 2005.

APPENDIX B Acoustic Detector Photographs



Photo 1. View of detector set up facing north (left) and east (right), site PR-1



Photo 2. View of detector set up facing south (left) and west (right), site PR-1



Photo 3. View of detector set up facing north (left) and east (right), site PR-2



Photo 4 View of detector set up facing south (left) and west (right), site PR-2.

APPENDIX C Resumes of Laura Berube and Caroline Byrne

Laura Berube

Project Scientist

Laura is a Project Scientist for projects involving avian studies for pre- and post-construction projects in the Northeastern United States. Laura is a wildlife biologist with strong bird identification skills and the ability to identify bird species by both sight and sound. She has recently performed diverse avian studies for a number of renewable energy projects in the Northeastern United States, with field work including visual raptor surveys, eagle point count surveys, nocturnal migrant radar surveys, breeding bird surveys, and acoustic bat surveys. Laura is proficient in data management, analysis, summary, and vigorous QAQC for a variety of avian wildlife surveys. Laura is also proficient in acoustic bat analysis including the use of automated analysis programs: Kaleidoscope, BCID, EchoClass, and Sonobat.

Laura is also responsible for conducting vernal pool surveys and natural resource assessments and supporting wetland delineations to assist with the preparation of local, state, and federal permit applications. She has worked on a variety of natural community and rare plant surveys and projects ranging from general reconnaissance observations to quantitative community- and species-specific surveys. These projects have involved natural community mapping and analysis for transportation projects, utility corridors, and development sites.

PROFESSIONAL EXPERIENCE

• Stantec Consulting. 2010-present. Project Scientist.
• University of Maine. 2009. Wildlife Department Field Assistant.

EDUCATION

Bat Conservation and Management - Acoustic Data Management Workshop, Bat Survey Solutions, LLC - Janet Tyburec and John Chenger, Fairfield, Maine, 2015

Bachelor of Science, Wildlife Ecology, University of Maine, Orono, Maine, 2010

Wilderness First Aid Certified, SOLO, Topsham, Maine, 2014

40-Hour HAZWOPER Certification, Topsham, Maine, 2014

OSHA 10-Hour Construction Certification, ClickSafety, Topsham, Maine, 2012

MEMBERSHIPS

Secretary/Treasurer, 2014-2019, The Wildlife Society, Maine

PROJECT EXPERIENCE

NATURAL RESOURCE SERVICES

Record Hill Wind Farm Raptor Surveys, Roxbury, Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Rollins Wind Farm Post-Construction Mortality Monitoring and Raptor Surveys, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Also conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Eastern Box Turtle Protection Plan and Construction, Brewster, Massachusetts

Conducted regular fence inspection in accordance with and NHESP-approved Eastern Box Turtle Protection Plan designed to protect box turtles in compliance with MESA during construction of a pump station development project. Responsible for documenting the presence of any box turtles in the vicinity of the fencing and reporting deficiencies in the fencing to appropriate personnel.

Stetson I and II Wind Farms Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras.

Oakfield Wind Project Avian Studies | Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Ecological Characterizations | Coos County, New Hampshire

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing

wildlife habitat values, and mapping of wetland and stream resources in a remote area of New Hampshire.

Hand Analysis of Bat Data | Topsham, Maine

Conducted analysis of bat detector data to determine species of bats for multiple project sites. Analysis results were then provided to clients to assist with their project planning and permit applications in compliance with applicable local, state, and federal natural resource regulations.

Wind Project | Eastern Maine

Project scientist responsible for organization, progress, and safety of field staff through the field work phase (wetland delineations, vernal pool surveys, and other natural resource mapping) of large-scale wind power development. Responsible for data management and associated reporting of findings to accompany state and federal permit applications.

Natural Resource Advisory Role in Oil Spill Response | Large Interstate Oil Spill in Gulf of Mexico | Natural Resource Advisor

Natural Resource Advisor (NRA) conducting environmental oversight of oil spill cleanup activities in compliance with an emergency consultation under Section 7 of the Endangered Species Act. NRAs worked directly with operational cleanup crews to implement Best Management Practices (BMPs). These BMPs served as the formal technical guidance issued under the emergency consultation. The objective of this work was to minimize secondary impacts of the cleanup activities on protected resources, including sea turtles, migratory and nesting shorebirds, beach mice, mangrove wetlands, estuaries, coastal wetlands, and dune systems. Implemented BMPs and conducted surveys for piping plover and sea turtles within designated critical habitats. Conducted training and oversight of cleanup crews and prepared daily reports documenting NRA activities. Worked closely with cleanup operations to provide education on BMPs and documenting daily compliance for use in USFWS consultation process and evaluation of secondary impacts to protected resources as part of the Natural Resources Damage Assessment (NRDA).

Proposed Wind Project Bird and Bat Surveys, Coye Hill, Connecticut

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Connecticut. These assessments included raptor surveys, acoustic bat surveys, and breeding bird surveys.

Beech Hill Wind Project | Aroostook County, Maine

Assisted in wetland delineations, vernal pool surveys, and Global Positioning System surveys for a proposed 34-turbine wind project and associated 67-mile transmission line. Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979). Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Proposed Wind Project | Central Maine

Conducted wetland delineations, vernal pool surveys, and Global Positioning System surveys over an area totaling approximately 6,800 acres for a proposed 55-turbine wind project in Central Maine. Determined wetland boundaries using the technical criteria described in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987). Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979). Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Orangeville, Marsh Hill, and Sheldon Wind Projects, Post-Construction Monitoring | Western New York | Technician Supervisor

Supervised four post-construction monitoring technicians. Responsible for timecard and expense approval, tracking completion of safety trainings, and communicating with staff about needs while in the field.

Proposed Solar and Infrastructure Update Projects | Vermont | Project Manager

Wrote the proposals and was Project Manager for proposed projects requiring northern long-eared bat (Myotis septentrionalis) surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Project | Maine | Project Manager

Project Manager for proposed wind project requiring pre-construction avian and wildlife surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Project, Down East Maine

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Maine. These assessments included raptor surveys, eagle point count surveys, acoustic bat surveys, nocturnal radar surveys, and breeding bird surveys. Analyzed and reported on data for reporting purposes related to impact assessment and permitting efforts.

Post-construction Avian Fatality Monitoring at a Developed Wind Project | New Hampshire | Project Manager

Project Manager of the post-construction monitoring survey conducted at a developed wind project in New

Hampshire. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client and applicable state and federal natural resource agencies to assist with the compliance of the permit.

Automated Program Analysis of Bat Data | Topsham, Maine

Conducted analysis of bat detector data using Kaleidoscope, BCID, and Sonabat software to determine species of bats for multiple project sites. Analysis results were provided to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Agency Meeting and Site Visit for Proposed Wind Project, Down East Maine

Attended a pre-application agency consultation meeting for a proposed wind project in Down East Maine. Attended a site visit at proposed project area with client and agency representatives. Provided information on pre-construction wildlife field surveys conducted by Stantec at proposed wind project.

Data Manager | Topsham, Maine

Responsible for managing data related to bird and bat studies conducted by the office. Responsible for the retrieval, and placement of data to assist in effective report writing and limiting of possible liability.

Rollins Wind Project Invasive Species Monitoring | Lincoln, Maine

Conducted invasive species surveys along a recently constructed transmission line right-of-way according to the standards and methods developed in the Invasive Species Management Plan.

Ichthyoplankton Sampling | Field Technician

Assisted in ichtyoplankton field sampling to characterize the marine egg and larvae community present and potentially susceptible to impingement and entrainment at the cooling water intake structure of a facility withdrawing cooling water from Penobscot Bay, in support of the Clean Water Act 316(b) for a confidential client. The results of the sampling will be included in 316b report and would be used to inform the design of the impingement control system to be eventually installed.

Schedule Coordinator | Topsham, Maine

Proposed Wind Project, Western New York

Conducted eagle point count surveys to determine eagle locations and behavior in relation to proposed wind turbines. Assisted in survey design, mapping, and implementation. Preformed quality assurance and control on data to inform potential collision risk of eagles as a result of the project.

Proposed Linear Project | New Brunswick, Canada

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing wildlife habitat values, and mapping of wetland and stream resources.

Groton Wind Farm, Raptor Surveys, Breeding Bird Surveys, Nocturnal Migrant Radar Surveys | Grafton County, New Hampshire | Task Manager

Responsible for the staffing and scheduling of field surveys. Also responsible for task managing the completion of sections of the final report to be delivered to the client. Conducted raptor, breeding bird, and nocturnal migrant radar surveys.. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Bull Hill Wind Farm Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Responsible for searcher efficiency trials, which involved the placement and monitoring of carcass retrieval by other surveyors.

Proposed Wind Projects | Maine | Task Manager

Responsible for the staffing and scheduling of field surveys including visual raptor surveys, eagle point count surveys, breeding bird surveys, and acoustic bat surveys. Also responsible for task managing the completion of sections of the final reports to be delivered to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Project | Northern California

Analyzed crepuscular radar data targeting federally threatened and state endangered marbled murrelets (Brachyramphus marmoratus) and reviewed and managed acoustic bat survey data for reporting purposes related to impact assessment and permitting efforts.

Block Island Wind Farm, Offshore | Rhode Island

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with the project’s compliance of applicable state and federal natural resource regulations.

Proposed Wind Project, Offshore | Northeast and Mid-Atlantic US

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with planning and permit applications in compliance with applicable state and federal natural resource regulations.

Caroline Byrne

Wildlife Biologist

Caroline Byrne is a project scientist and bat biologist, specializing in rare species assessments and bioacoustics. She has a wide range of experience with wildlife assessments for birds, bats, turtles, cave fauna, and vegetation. She has conducted extensive mist netting, acoustic, and telemetry surveys and is a federally permitted bat biologist. Caroline has project experience in various sectors including commercial (renewable energy and development), Federal (Department of Defense, Environmental Protection Agency US Fish and Wildlife) and state agencies. Caroline will be working with the emerging EchoPitch program and related research projects funded by the US Department of Energy, National Renewable Energy Laboratory, Renewable Energy and Wildlife Institute, and private clients. Caroline has a BS from Binghamton University and a MS from Indiana State, where she researched Indiana bat social calls and behavior. She has conducted extensive mist netting, acoustic, and telemetry surveys and is a federally permitted bat biologist. Most recently, she has worked as a wildlife research biologist for Biodiversity Research Institute in Portland, Maine.

EDUCATION

Master of Science, Biology, Indiana State University, Terre Haute, Indiana , 2015

Bachelors of Science, Environmental Science: Ecosystems , Binghamton University, Vestal, New York, 2010

CERTIFICATIONS & TRAINING

30-hour Construction Safety and Health , Occupational Safety and Health Administration, San Diego, California, 2022

Wilderness First Aid, Wilderness Medical Associates International, Portland, Maine, 2021

Soundscape Analysis: From Data to Graphs, Wildlife Acoustics, Inc., Maynard, Massachusetts, 2021

Bat Acoustics Training and Analysis Course, Wildlife Acoustics, Maynard, Massachusetts, 2016

Raven Sound Analysis Workshop, Cornell Lab of Ornithology, Ithaca, New York, 2013

Acoustic Techniques Workshop, Bat Conservation Managment, Newburyport, Massachusetts, 2011

Bat Automatic Identification Software Workshop , Western EcoSystems Technology, Inc., Pikeville, Tennessee, 2013

Properties of Sound: How Bat Detectors Work, Wildlife Acoustics, Inc., Maynard, Massachusetts, 2020

MEMBERSHIPS

President-elect, Northeast Bat Working Group, 2009-Present

Past President, The Wildlife Society, Maine, 2015-Present

PROJECT EXPERIENCE

MILITARY

Rare, Threatened, and Endangered Bat Surveys at US Naval Installations | Field Coordinator, Federally Permitted Biologist at Biodiversity Research Institute

While at Biodiversity Research Institute, Caroline performed rare, threatened, and endangered bat surveys throughout the eastern United States, including acoustics: deployment, automated analysis and qualitative review, mist-netting, homing telemetry, foraging telemetry, and hibernacula surveys.

BAT BIOLOGY

Threatened and Endangered Bat Surveys at Ely Mine | Vershire, Vermont | Federally Permitted Biologist, Biodiversity Research Institute

Performed mist-netting surveys, acoustics (deployment, automated analysis, and qualitative analysis), day roost telemetry, automated foraging, and home range telemetry. Compiled results into reports to client and permitting agencies.

Indianapolis International Airport Indiana Bat Project | Indianapolis, Indiana | Graduate Researcher-Indiana State University

Lead a long-term Indiana bat monitoring project. Long-term monitoring of local bat populations included mist netting long-term netting sites with a minimum of 12 per month, radio telemetry and transmitter attachment in order to track foraging bats and locate day roosts, spotlight checks, and emergence count to monitor roost use.
• Vegetation surveys
• Report preparation: Prepared biweekly and annual reports of study results
• Thesis research: Describing the social behavior of Indiana bats (Myotis sodalis) at day roost sites.
• Deployed Pettersson D500X and night vision video to record social behavior at maternity roosts
• Developed ethogram detailing visual and acoustic behaviors
• Coded video for behaviors and analyzed acoustic behaviors in Raven Pro

EMPLOYMENT HISTORY

Biodiversity Research Institute
Mammal Program Field Coordinator

2015 - 2022 · 7 years

Project Management:
• Staffing: Supervise and manage all field staff including other field leads

Permitting: Application, management, and reporting for permits on both the state and federal level

Development: study plans, scopes of work, and standard operating procedures, worked directly with numerous clients including DOD (Navy, Air Force, Army, and Marines), EPA, State Agencies, USFWS, USNPS, Army National Guard, Army Core of Engineers, Air National Guard, and renewable energy companies (i.e., solar and offshore wind)

Logistics: arranged vehicles, lodging, equipment, and staffing schedules

Field Program Work:
• Overseeing all aspects of the capture and radio tracking of Eastern bat species.
• As of 2020, I have identified 13 bat species in North America totaling >1,700 individual bats in hand. In North America, from Maine to South Carolina to Illinois.
• Supervise and participate in the live capture of bats, and monitor and take samples according to the scope of work and approved protocols.
• Daytime radio telemetry to locate roosting sites, nighttime telemetry with up to five teams for simultaneous foraging telemetry for home range analysis.
• Development, siting, production, and execution of nano-telemetry towers for MOTUS network monitoring, captured and tagged bats with MOTUS transmitters during migration
• Hibernacula and anthropogenic structure surveys
• Surveys for Canada lynx with the use of camera traps and scent stations
• Assisted in drafting bat portions of Construction and Operations Plans (COP) for offshore wind development

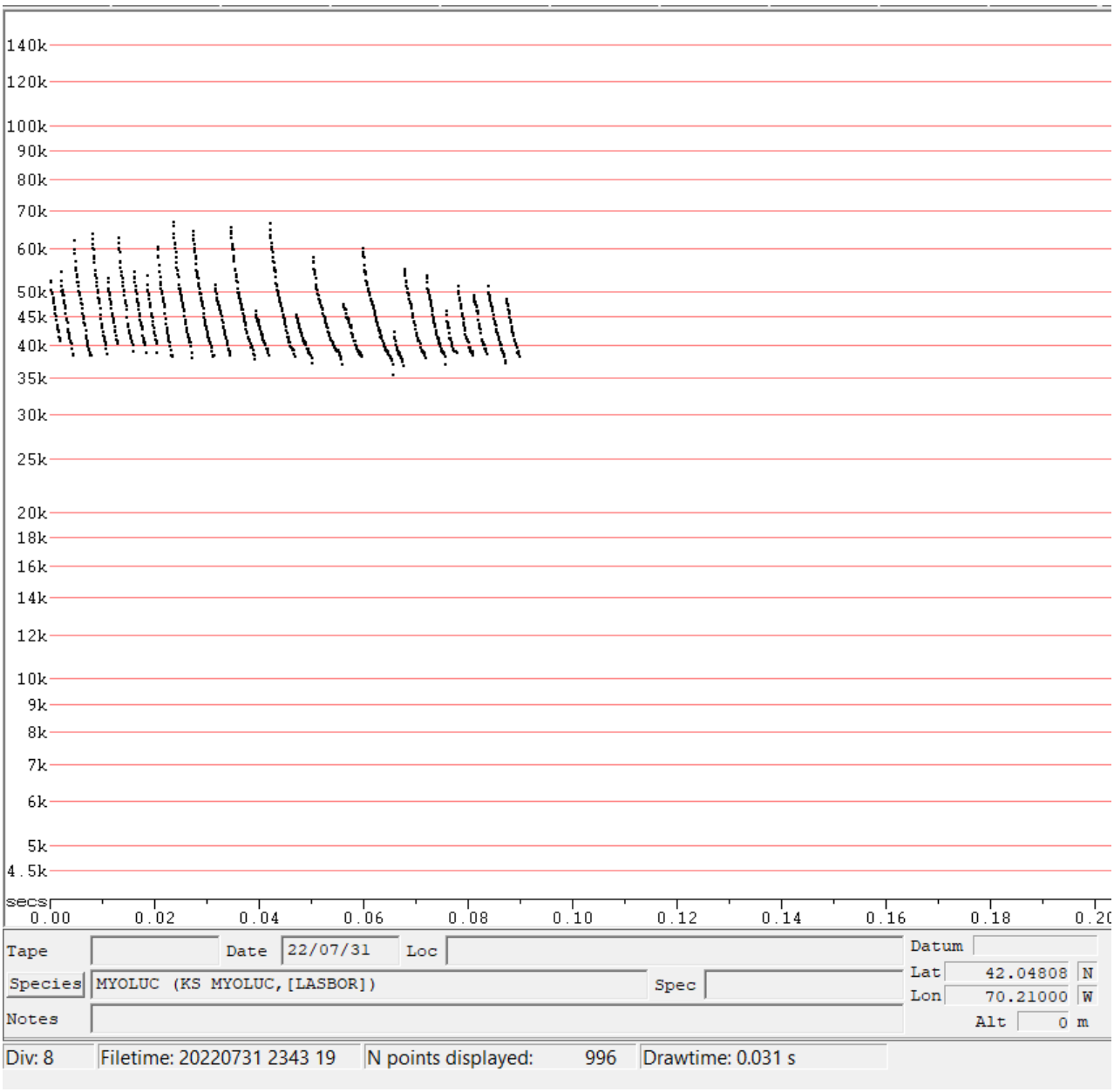
Acoustics (birds and bats):
• Develop standard operating procedures for acoustic monitoring with various detectors, software, and deployment types
• Deployment and analysis of acoustic monitoring methods for bats
• Deployed Pettersson D500X, 240X, and M500, Anabat SD2, Binary Acoustics AR125, Wildlife Acoustics SM2, SM3, and SM4 to record bat activity
• Post- processing analysis with SonoBat, Kaleidoscope Pro., EchoClass, Sonobat, Raven, and Audacity
• Manual vetting: extensive experience in manual vetting of recordings of eastern bat species
• Offshore wind energy acoustic deployments and acoustic processing and vetting

Indiana State University
Graduate Student

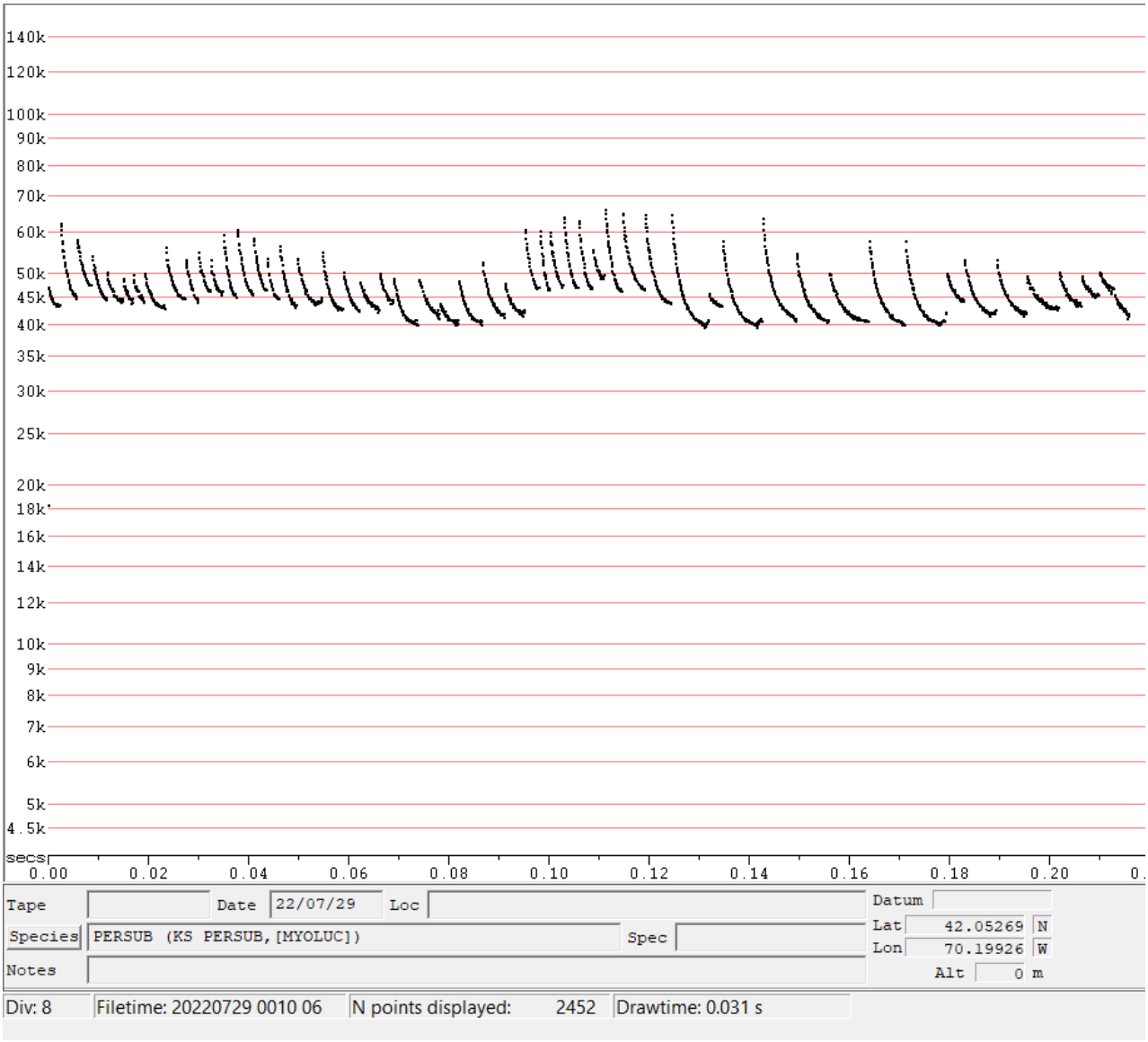
2013 - 2015 · 3 years

Long term monitoring of local bat populations: Mist netting long term netting sites, radio telemetry and transmitter attachment in order to track foraging bats and locate day roosts, spotlight checks and emergence count to monitor roost use. Vegetation surveys. Report preparation. Deployed acoustic monitors and night vision video to record acoustic and visual behavior at maternity roosts, analyzed hundreds of hours of acoustic and video data. Developed ethogram detailing visual, through behavioral coding of video and acoustic behaviors through qualitative and statistically analysis of acoustic behaviors.

APPENDIX D Screenshots of Bat Passes



Appendix D. Figure 1. Screenshot of a little brown bat pass recorded on the night of July 31, 2022, for the corridor improvements and related work on Shank Painter Road, Provincetown, Massachusetts, site PR1.



Appendix D. Figure 2. Screenshot of an eastern red bat pass recorded on the night of July 29, 2022, and autoclassifed as a tri-colored bat by KPro for the corridor improvements and related work on Shank Painter Road, Provincetown, Massachusetts, site PR-2.

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DOCUMENT A00860

PROVINCETOWN CONSERVATION COMMISSION

NOTICE OF INTENT

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NOTICE OF INTENT
SHANK PAINTER ROAD AND ROUTE 6 ROADWAY RECONSTRUCTION

Department of Public Works
Town of Provincetown, MA

July 2025

APPENDIX F - STORMWATER REPORT

APEX

PROVINCETOWN CONSERVATION COMMISSION
OFFICE OF COMMUNITY PLANNING
TOWN OF PROVINCETOWN
260 COMMERCIAL STREET
PROVINCETOWN, MASSACHUSETTS 02657
(508)487-7020

Local Bylaw, RDA and NOI Filing Checklist

Please submit this checklist along with your application to ensure your application is complete.

In addition to hard copies of applications, please submit all materials through the online portal at https://provincetownma.portal.opengov.com/categories/1081

Submit hard copies as follows: one (1) original and one (1) copy of the completed application, associated documents and plans collated into packets consisting of the following:[1]

☒ **Application Form**: Local Bylaw Filing, Request for Determination of Applicability ***OR*** Notice of Intent (consult with Conservation Agent to confirm appropriate type of filing)

☒ **Certified Abutters List**: From the Assessor's Office ($25)[2]

☒ **Abutter's Notification Form**: Completed copy sent to abutters, plus Certificates of Mailing (to be submitted to the Conservation Agent at the Public Hearing) – Certificate of Mailing Instructions online

☒ **Map**: Showing site locus Full sized plans are 24"x36".

☒ **Site Plans:** 11"X17" drawn to scale (+ 1 copy 18"x 24" for NOI's) consisting of:

Existing Conditions – showing property boundaries, contour lines, existing structures, existing vegetation, wetland resource areas with 50, 80 and 100ft buffer zones, NHESP Habitat boundaries (if applicable)

Proposed plans – showing limit of work, location and type of erosion controls, site access and equipment staging area, vegetation to be removed/replanted, re-grading, existing structures to remain and proposed structures, landscaping, hardscaping, retaining walls, drainage structures, septic system, utilities

** This level of detail may not be applicable for small projects – confirm with Conservation Agent*

☒ **Project Narrative and Construction Protocol**: Identify wetland resource areas and measures taken to meet performance standards set forth in the Wetlands Protection Regulations, 310 CMR 10.00 and/or the Provincetown Wetlands Protection Bylaw, Chapter 12

☒ **Color Photographs of the Site**: Taken from various vantage points to show existing site conditions

☒ **Planting Plan**: Submit if project involves vegetation removal (Approved Plantings list available online)

☒ **MESA Project Review Checklist**: Include a copy if the project is within NHESP Estimated and Priority Habitat and is not exempt under 321 CMR 10.14

☒ **Fee:** NOI Wetlands Fee Transmittal Form (town portion of WPA fee + $100 local bylaw fee), local RDA Fee ($100) or Local Bylaw Filing Fee ($100)[2] Town Project - Fee Exempt

By signing this, I confirm submission of all relevant materials listed above.

Signature of Applicant _____ Date 1/17/25

Project Address: Shank Painter Road, Route 6, and Court Street

[1] *Except for Local Bylaw filings only*, an additional copy of the completed application and associated documents and plans must be submitted online through the eDEP website, or sent by certified mail or hand delivery to the MassDEP's Regional Office at the following address: Department of Environmental Protection, Southeast Region, 20 Riverside Drive, Lakeville, MA 02347

[2] Town fees may be submitted through the online portal linked above.

July 30, 2025

Provincetown Conservation Commission
260 Commercial Street
Provincetown, MA 02657

RE: Wetlands Protection Act: Notice of Intent – Limited Project
Shank Painter Road and Route 6 Roadway Reconstruction Project
Town of Provincetown, MA

Dear Commissioners,

On behalf of the Town of Provincetown's Public Works Department, Apex Companies (Apex), formerly Environmental Partners (EP), is submitting this updated and revised Notice of Intent (NOI) package for the Shank Painter Road, Route 6, and Court Street Road and Drainage Reconstruction project in accordance with the Massachusetts Wetlands Protection Act (M.G.L Chapter 131 Section 40), the Massachusetts Wetlands Protection Regulations (310 CMR 10.00), and the Provincetown Wetland Regulations.

This project is being submitted as a Limited Project. As the work is maintenance and improvement of existing public roadways, and improving inadequate drainage, this qualifies as a Limited Project per 310 CMR 10.53(3)(f).

This project is subject to Massachusetts Endangered Species Act (MESA) review. A separate MESA filing was submitted in January 2025, with NHESP tracking number 25-19242. A final MESA determination was received on June 27, 2025, requiring that a Turtle Protection Plan be submitted to NHESP prior to the start of work.

The work in resource areas includes work in Bordering Vegetated Wetlands (BVW), Isolated Vegetated Wetlands (IVW), and Land Subject to Coastal Storm Flowage (LSCSF). Work in the BVW and IVW is associated with two drainage outfalls and one drainage overflow structure. Much of the work on Shank Painter Road and Court Street are within the LSCSF area.

This NOI was originally submitted on January 17, 2025. The January submittal included wetland flagging dated 2016 and 2019. This revised submittal includes updated wetland flagging completed in March 2025.

This submittal includes the following attachments. Documents that have been updated with this May submittal are noted as "Updated":

- NOI Project Narrative **(Updated)**
  - Appendix A: WPA Form 3 and Wetlands Transmittal Form **(Updated)**
  - Appendix B: Wetland Evaluation/Delineation Reports **(Updated)**
  - Appendix C: Project GIS Mapping

- Appendix D: Permitting Design Plans **(Updated)**
- Appendix E: Certified Abutters List and Notification Form **(Updated)**
- Appendix F: Stormwater Report **(Updated)**
- Appendix G: Site Photos
- Appendix H: Assessors Maps
- Appendix I: NHESP Proof of Mailing and Conditional Approval **(Updated)**
- Appendix J: Compensatory Storage and Wetland Impact Area **(Updated)**

If you should have any questions or require additional information, please do not hesitate to contact me using the information below.

Sincerely,

Maria George

Apex Companies, LLC.
Maria E. George, PE
Senior Project Engineer
P: 617.657.0200
E: maria.george@apexcos.com

CC: Department of Environmental Protection – Southeast Regional Office
Natural Heritage & Endangered Species Program
Jim Vincent – Provincetown Department of Public Works, Director
Braden Witt – Provincetown Department of Public Works, Senior Project Manager
Ryan J. Paul, PE, CFM – Apex
Benny L. Hung, PE – Apex
Erica N. Larner, MassDOT Wetlands and Water Resource Coordinator

NOI PROJECT NARRATIVE

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Appendix E: Certified Abutters List and Notification Form (Placeholder)

Appendix F: Stormwater Report

Appendix G: Site Photos

Appendix H: Assessors Map

Appendix I: NHESP Proof of Mailing and Conditional Approval

Appendix J: Compensatory Storage and Wetland Impact Area

INTRODUCTION

The project work area is located in Provincetown in the following roadways:

- **Route 6**, approximately between Province Lands Road and the intersection of Route 6 and Shank Painter Road.
    - The work on Route 6 included in this NOI application extends from STA 718+46 eastward. The rest of Route 6 west of these limits are included in the Cape Cod National Seashore Outstanding Water Resource Zone and will be constructed and permitted by others.
    - The work extends east of the Route 6 and Shank Painter Road intersection by approximately 400-feet.
- **Shank Painter Road** between Route 6 and Bradford Street, and including the intersections of Shank Painter Road and its associated side streets
- **Court Street** from Shank Painter Road extending approximately 570-feet along Court Street

Project Need

Shank Painter Road provides access between Route 6 and downtown Provincetown. Presently, the four-lane divided Route 6 corridor creates a barrier at the northern limit of Shank Painter Road making it challenging for bicyclists and pedestrians to reach popular recreational destinations along Route 6 such as the Cape Cod National Seashore, Herring Cove Beach, the Shank Painter Ponds and several trails. In addition, the existing sidewalks on Shank Painter Road are inadequate for safe pedestrian traffic between Route 6 and downtown Provincetown.

Shank Painter Road and its surrounding properties regularly experience local flooding issues due to the small existing drainage network providing only minimal collection and conveyance. Most notably, the Town has concerns regarding the significant flooding occurring on Court Street, a mixed commercial and residential street that intersects with Shank Painter Road. The area has been experiencing flooding depths greater than 6 inches of standing water occur during intense storms, and greater depths have been found under modeled severe storms. This localized flooding constantly impacts surrounding property owners and traffic.

Project Overview

To improve pedestrian and bicycle connections, Apex is proposing a combination of shared-use paths, sidewalks, and narrowed vehicular travel lanes along Route 6 and Shank Painter Road. At the Route 6 and Shank Painter Road intersection, a roundabout is proposed to efficiently process and calm motorist traffic as it enters this final section of Route 6 and Cape Cod.

Apex is proposing a new stormwater management system along Shank Painter Road and Route 6 that combines the installation of new catch basins, conveyance piping, subsurface infiltration chambers, and a new detention pond and sedimentation forebay to provide improved drainage management. Additionally, Apex proposes to install a stormwater pump station on Court Street, which will allow for mitigation of the flooding within site restrictions. For more information on alternatives analysis, refer to EP's February 2021 Preliminary Design Memo and the Stormwater Report provided in Appendix F.

Anticipated Permits and Approvals

Due to overlap with certain resource areas, several permits are needed for this work.

- The work is in both the buffer zone and within the following wetland resource areas:
  - Bordering Vegetated Wetlands
  - Isolated Vegetated Wetlands
  - Bordering Land Subject to Flooding

  Refer to the "Wetland Resource Areas and Compliance" section on page 5 for additional information.
- The work on Route 6 overlaps with NHESP Estimated Habitats of Rare Wildlife, and NHESP Priority Habitats of Rare Species. Refer to the "NHESP Estimated Habitats of Rare Wildlife, and NHESP Priority Habitats of Rare Species" section on page 9 for additional information.

Table 1 below lists all necessary permits and approvals for the Project anticipated by the Applicant at this time. Should additional permits or approvals be identified throughout the development of the Project, the Applicant will respond accordingly to comply with all local, state, and federal regulations.

Table 1: Anticipated Project Permits and Approvals

Agency	Permit/Approval	Status
Federal		
U.S. Army Corp. of Engineers (USACE)	Self Verification Form (SV)	To be submitted in July 2025
Commonwealth of Massachusetts		
MassWildlife's Natural Heritage & Endangered Species Program (NHESP)	Massachusetts Endangered Species Act (MESA)	Submitted January 21st, 2025, conditionally approved on June 27, 2025
Town of Provincetown		
Conservation Commission	Notice of Intent Order of Conditions	To be obtained; NOI submitted herein

Limited Project

This project is being submitted as a Limited Project.

Per 310 CMR 10.53(3)(f) and 310 CMR 10.24(7)(c)(1), "maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage" qualifies as a limited project. This project is primarily a roadway improvement project and an improvement on inadequate drainage systems. The roadway improvements will improve pedestrian and bicycle connections, and efficiently process and calm motorist traffic at the intersection of Route 6 and Shank Painter. The

drainage improvements will improve the inadequate drainage on Shank Painter Road and alleviate the frequent flooding on Court Street.

In addition, per 310 CMR 10.53(3)(d), "the construction, reconstruction, operation and maintenance of underground and overhead public utilities, such as … sewer and water" is a limited project. The proposed drainage improvements on Court Street will involve relaying sewer and water pipes, which can be considered a limited project.

PROPOSED CONDITIONS

The work on Route 6 west of the intersection with Shank Painter Road includes the following work:

- Converting the northern travel lanes into a two lane roadway with one lane traveling in either direction.
- Converting the southern travel lanes into a shared use bike path.
- Constructing four connections from the northern travel lanes to properties off of the southern travel lanes with access roads through the existing median. Tree clearing in these areas amounts to approximately 0.14 acres.
- Limited drainage work is occurring in this area, including resetting catch basin frames and grates.

The proposed work at the intersection of Route 6 and Shank Painter Road includes the following:

- Redesigning the intersection to be a roundabout, transitioning the four lane divided highway east of the rotary to the new two lane highway and shared use path west of the rotary.
- Drainage work in this area includes sending local drainage to drywells, and sending drainage from the Shank Painter Road area to an infiltration basin to the north side of the intersection.

The proposed work on Shank Painter Road includes the following:

- Adding sidewalks on both sides of the road.
- Adding bike lanes in the road right of way.
- Drainage improvements, described in detail in the Stormwater Report included in Appendix. F. Drainage improvements generally include:
    - New catch basins, drain manholes, and piping throughout Shank Painter Road.
    - A drainage outfall to the Court Street Isolated Vegetated Wetland area.
    - A subsurface infiltration chamber under a parking lot towards the south end of Shank Painter Road.
    - A drainage outfall to the South Shank Painter Bordering Vegetated Wetland area.
- Several trees will be cut to make room for the roadway reconstruction with safe sidewalks and bike lanes. Trees will be replanted throughout the roadway where space permits.

The proposed work on Court Street includes the following:

- Installing a drainage overflow from the Court Street Isolated Vegetated Wetland area to the Court Street drainage network.

- Installing a new Stormwater Pump Station at the intersection of Court Street and Winthrop Street. This pump station discharge flow north along Shank Painter Road, eventually flowing to the infiltration basin on the north side of the intersection of Route 6 and Shank Painter Road.
- Roadway mill and overlay, and general site restoration.

Proposed Environmental Protection Measures

In order to mitigate impacts to wetland resource areas during construction activities, environmental protection measures will be provided.

The following Best Management Practices (BMPs) are located on the Plans in Appendix D.

- **Sedimentation control devices** (e.g. filter sock and silt fence, silt sacks, cofferdams) will be installed along Shank Painter Road, Court Street, and Route 6 within the project limits upgradient of the Bordering and Isolated Vegetated Wetland areas. Erosion and sedimentation control devices will be inspected daily during construction. The filter sock will control sedimentation and erosion from the upland areas and also serve to define the limits of work.
- **Sandbag cofferdams** will be used in the Court Street wetland area and South Shank Painter wetland area as sedimentation control and to keep any standing water outside of the work zone.
- **Trench dewatering activities** will use dewatering bags at the pump discharge for sediment control and water quality. The bags will be placed outside of the project site. Filter sock will surround the bags to prevent erosion.
- **Stockpiles of aggregate** materials (sand, gravel, and stone) will be maintained on-site as needed outside of the resource areas and buffer zones. Any unsuitable material excavated will be stockpiled separately of all other construction materials.
- **Disturbed areas** will be limited to the areas within the limit of work. The limit of work was restricted to the maximum extent practicable. All disturbed areas will be stabilized and restored to original conditions with loam and seed after construction. Seeding of disturbed areas will be with a New England Conservation Seed Mix or similar, and free of fertilizers. Loam will be low nitrogen and native to the surrounding area.

The contractor will be responsible for preparing a stormwater pollution prevention plan, which will include information on equipment, staging and laydown location, and proposed stockpile locations.

WETLAND RESOURCE AREAS AND COMPLIANCE

Based on our review of 310 CMR 10.00: Wetlands Protection and based on wetland delineations performed by Pinebrook Consulting in March of 2025, the proposed work activities are subject to the filing of a Notice of Intent with the Provincetown Conservation Commission and MassDEP. Refer to the wetland reports included in Appendix B for a detailed overview of each wetland system, flag numbers, general vegetation overview, and dominant plant species.

The Town of Provincetown is listed as having registered wetlands with accompanying restriction orders under the Coastal Wetlands Restriction Act (c.130, s.105). This project does not propose any disturbance to wetland areas with restriction orders.

The proposed work area includes the following wetland resources:

- Bordering Vegetated Wetland (BVW) – 310 CMR 10.55
- Isolated Vegetated Wetlands (IVW) – Provincetown Wetlands Protection Bylaw
- Land Subject to Coastal Storm Flowage (LSCSF)

Photos of the wetland resource areas are included in Appendix G.

Bordering Vegetated Wetland (BVW) – 310 CMR 10.55:

Route 6 Bordering Vegetated Wetlands

- **Existing Conditions**: Along the proposed work on Route 6, there are eight (8) flagged bordering vegetated wetland areas identified.
- **Proposed Work:** The work on Route 6 will overlap with the 100-ft buffer zones of these resource areas.
- **Avoided Disturbance:** Disturbance to bordering vegetated wetland resource areas was avoided in all other BVW areas by strategically shrinking the footprint of the project area. The infiltration basin north of the intersection of Route 6 and Shank Painter Road will be constructed near, but not in, bordering vegetated wetland associated with Duck Pond. The retaining wall along the infiltration basin forebay was designed to avoid wetland impacts. In addition, the layout of the infiltration basin was designed so that the limits of disturbance will not impact the BVW. There will be no disturbance of this bordering vegetated wetland area.
- **Compliance:** There will be no work in the BVW areas along Route 6.

South Shank Painter Bordering Vegetated Wetland

- **Existing Conditions:** Along Shank Painter Road, there is one flagged bordering vegetated wetland area at the South Shank Painter wetland area located near Shank Painter STA 35+00.
- **Proposed Work:** Work in the bordering vegetated wetland resource area is required to install the new drainage outfall 416-OF in the South Shank Painter wetland area. Refer to Appendix D sheet 166 for the outfall grading plan, and refer to Appendix J for an overview of the wetland impacts. Table 2 includes a summary of the bordering vegetated wetland impact areas.

- Work includes installing a flared end pipe, riprap for energy dissipation, and regrading around the outfall. The impact area was measured as the area between the erosion controls and the wetland flags.
- The flared end outfall will be installed outside of the wetland area.
- The rip rap pad will overlap with the existing wetland area. Regrading around the outfall will cut back the grade around the outfall. This allows for wetland replication on both sides of the outfall. The area of wetland replication was conservatively measured as the area of wetland added below the proposed 5 foot contour line.
- All temporary wetland impact areas and wetland replication areas will be restored by reusing the existing hydric soils as topsoil and reseeding with a New England Conservation Wetland Wet Seed Mix (Wetmix).

Table 2: Bordering Vegetated Wetland Impact Area

Impact	Existing Wetland Alteration	Proposed Wetland Replacement
Temporary Impact	654.7 SF	654.7 SF
Permanent Impact	34.3 SF[1]	38.0 SF[2]
Total Impact	**689.0 SF**	**692.7 SF**

1. This value refers to the area of the rip rap pad that extends into the existing wetland area.
2. This value refers to the replication area added to replace the wetland area lost from the rip rap pad.

- **Avoided Disturbance:** The outfall was located as close to the roadway as possible while still providing room for a stable sloped surface from the back of sidewalk to the outfall.
- **Compliance with General Performance Standards**: Applicable performance standards for activities conducted within this resource area are defined under 310 CMR 10.55(4)(a through e).
  - *Performance Standard 4(a)* - Any proposed work in a BVW shall not destroy or otherwise impair any portion of said area. A rip rap pad will be installed in a small area in the South Shank Painter wetland area. See performance standard 4(b) for more information. Beyond the rip rap pad, all disturbed wetland area will be restored in place to its preconstruction conditions by reusing existing hydric soils as topsoil and reseeding with a New England Conservation Wetland Wet Seed Mix (Wetmix).
  - *Performance Standard 4(b)* - The area of rip rap overlap with the flagged South Shank Painter BVW will be replicated in accordance with Standard 4(b).
    1. The surface of the replacement area is greater than the lost area.
    2. The ground water and surface elevation of the replacement area are approximately equal to that of the lost area. The replication area was conservatively measured as the added wetland area below the proposed 5-foot contour. This elevation is entirely within the flagged BVW area.
    3. The replication area is immediately adjacent to the lost area.
    4. The replication area is immediately adjacent to the lost area, and therefore is hydraulically connected to the same wetland body.

5. The replication area is immediately adjacent to the lost area, and therefore is part of the same wetland body.
6. At least 75% of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons. The replication area will be seeded with a New England Conservation Wetland Wet Seed Mix (Wetmix). Slopes greater than 3:1 will be stabilized with erosion control fabric.
7. The replication area will be restored consistent with all other general performance standards in 310 CMR 10.00.

- *Performance Standard 4(c)* - The small loss in wetland area will be replicated as noted in standard 4(b).
- *Performance Standard 4(d)* - The wetland area disturbance in the South Shank Painter wetland area does not overlap with NHESP identified habitats of rare species.
- *Performance Standard 4(e)* - There are no areas of critical environmental concern in the project site.

Isolated Vegetated Wetlands (IVW) – Provincetown Wetlands Protection Bylaw

Court Street Isolated Vegetated Wetlands

- **Existing Conditions**: Along Shank Painter Road, there are two flagged isolated vegetated wetland areas: the Court Street wetland area located at the intersection of Court Street and Shank Painter Road, and the Winthrop Street wetland area located near Shank Painter STA 33+50. No work will occur within the Winthrop Street wetland area.
- **Proposed Work:** Work in the Court Street isolated vegetated wetland resource area is required to install two new drainage structures: Outfall 212-OF along the Shank Painter Road side of the wetland, and the Court Street wetland overflow structure on the Court Street side of the wetland. Refer to Appendix D sheet 166 for the outfall grading plan, and refer to Appendix J for an overview of the wetland impacts. Table 3 includes a summary of the isolated vegetated wetland impact areas.
    - Work includes installation of a retaining wall, installation of rip-rap for energy dissipation, installation of the overflow structure, and regrading around the structures.
    - The retaining wall and structures will be installed outside of the wetland area. Work occurring within the wetlands includes regrading to connect the completed headwall and outfall pipe to the existing surface. Regrading will result in a small expansion of the wetland area at Outfall 212-OF.
    - A portion of the rip rap pad for Outfall 212-OF will be installed within the existing wetland area. This loss in IVW will be replicated immediately adjacent to the rip rap pad. Replication was conservatively estimated as areas below the 6-foot contour.
    - All wetland areas disturbed from construction will be repaired by reusing the existing hydric soils as topsoil and reseeding with a New England Conservation Wetland Wet Seed Mix (Wetmix).

Table 3: Isolated Vegetated Wetland Impact Area

Impact	Existing Wetland Alteration	Proposed Wetland Replacement
Temporary Impact, Court Street Overflow	86.0 SF	86.0 SF
Temporary Impact, Court Street Outfall	234.5 SF	234.5 SF
Permanent Impact	10.5 SF[1]	10.5 SF[2]
Total Impact	**331 SF**	**331 SF**

1. This value refers to the area of the rip rap pad that extends into the existing wetland area.
2. This value refers to the replication area added to replace the wetland area lost from the rip rap pad.

- **Avoided Disturbance:** Disturbance to wetland resource areas was minimized to the maximum extent practicable. The retaining wall along the Court Street wetland area was designed to avoid permanent wetland impacts to the maximum extent practicable and minimize temporary wetland impacts, keeping the work close to the roadway. The Court Street overflow structure was located outside of the flagged wetland area.
- **Compliance with Provincetown Wetland Bylaw**
    - Per paragraph 12-7-5 of the Provincetown Wetland Bylaw, wetland loss or alteration should be avoided or minimized wherever feasibly. Where alteration is unavoidable, full mitigation is required.
    - Temporary and permanent impacts to the isolated wetland cannot be avoided due to the necessity of creating a graded transition from the outfall and overflow to the wetland resource area. The impacts were minimized by keeping the work as close to the roadway as possible. Full mitigation on site will be provided to restore the temporarily disturbed IVW areas and replicate the small loss in resource area from the rip rap pad by reusing existing hydric soils as topsoil and reseeding with a New England Conservation Wetland Wet Seed Mix (Wetmix).

Land Subject to Coastal Storm Flowage (LSCSF)

The FEMA 1% Annual Chance Flood Hazard Zone overlaps with the project limits on Court Street and along the South End of Shank Painter Road, as shown in Figure 2 in Appendix C. Work in this resource area is required to provide a new drainage system and to reconstruct and regrade the roadway. Per FEMA panel 25001C0112J (effective date 7/16/2014), the 1% annual change flood hazard zone has a flood elevation of 9.0 feet. This flood zone is coastally influenced through Shank Painter Pond, and is therefore Land Subject to Coastal Storm Flowage (LSCSF).

Refer to Appendix J for a figure showing the existing and proposed surface contours within the flood zone area. The existing project area with an elevation less than 9.0-feet is 79,482 SF. The proposed project area with an elevation less than 9.0-feet is 77,798 SF.

Grades are being raised in order to facilitate construction of sidewalks and bikelanes for safe pedestrian traffic accommodations. The subsurface infiltration basin on the south end of Shank Painter Road, and the pump station on Court Street functions to offset the loss in storage area.

Compliance with General Performance Standards

As of the date of submitting this application, there are no performance standards for LSCSF.

The work in this resource area does not overlap with any other resource areas stated in 310 CMR 10.24 General Provisions, including Areas of Critical Environmental Concern.

OTHER IMPACTS

The site is adjacent to or overlapping with the following other resource areas:

Outstanding Resource Water – Outside of Project Limits

The Cape Cod National Seashore is classified as an Outstanding Resource Water. This resource area is outside of the limits of work and will not be directly disturbed. The proposed infiltration basin overflow will discharge into the Duck Pond Wetland Area, which is in close proximity to Cape Cod National Seashore.

NHESP Estimated Habitats of Rare Wildlife, and NHESP Priority Habitats of Rare Species

The project limits overlap with areas of NHESP Estimated Habitats of Rare Wildlife (EH 697) and Priority Habitats of Rare Species (PH 892) along Route 6. This NOI is being submitted under the Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review process for work proposed within Estimated Habitat. There is no streamlined review for Priority Habitat. Therefore, this project requires Massachusetts Endangered Species Act (MESA) review. The MESA checklist was submitted separately on January 21st 2025. NHESP filing number is 25-19242. Proof of submission to MESA is included in Appendix I. NHESP issued a letter of conditional approval on June 27, 2025. The one (1) condition included was that a Turtle Protection plan must be prepared and approved prior to the start of work.

The work in the NHESP habitats includes the majority of the work proposed on Route 6. The total area of work on Route 6 that overlaps with NHESP habitats is 6.73 acres. The following work overlaps with the NHESP habitat areas:

- Roadway reconstruction to replace the Route 6 four lane highway with a two lane highway on one side of the median, and a shared use path on the other side of the median,
- Route 6 and Shank Painter Road intersection redesign, including installation of the proposed rotary, and
- The stormwater forebay and detention basin at the north side of the intersection.

The majority of the work on Route 6 that overlaps with NHESP habitats is exempt from review. Per 321 CMR 10.14 (12), the existing roadway and work within 4’ of the roadway shoulder are exempt from review. This accounts for approximately 6.09 acres if the work.

The remaining 0.64 acres of work is on existing pervious surfaces and is subject to review. This value is reported on WPA Form 3 in Appendix A, Section C.1.c. This work includes four new connections between the north and south travel lanes on Route 6, and the infiltration basin to the north of the intersection of Route 6 and Shank Painter Road. Tree clearing in these areas amounts to approximately 0.14 acres.

The project will involve work on multiple properties, so Assessors maps that cover this entire area are included in Appendix H.

MASSDEP STORMWATER STANDARDS

Based on our review of 310 CMR10.00 and the Massachusetts Stormwater Standards, we have determined that this project is a Redevelopment Project. Stormwater Standards 2 and 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6 have been met to the maximum extent practicable. For information on the MassDEP Stormwater Standards and Alternatives Analysis, refer to the Stormwater Report in Appendix F.

PUBLIC NOTIFICATION

The certified abutter list and notification to abutters letter is included in Appendix E.

APPENDIX A

MassDEP Transmittal Form and WPA Form 3 – Notice of Intent

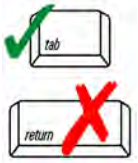
Massachusetts Department of Environmental Protection
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WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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Provincetown
City/Town

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Shank Painter Rd, Route 6, and Court St (a. Street Address) | Provincetown (b. City/Town) | 02657 (c. Zip Code)

Latitude and Longitude: 42.051408 (d. Latitude) | -70.195441 (e. Longitude)

See Project Narrative (f. Assessors Map/Plat Number) | N/A (g. Parcel /Lot Number)

2. Applicant:

Braden (a. First Name) | Witt (b. Last Name)

Town of Provincetown (c. Organization)

260 Commercial Street (d. Street Address)

Provincetown (e. City/Town) | MA (f. State) | 02657 (g. Zip Code)

508-487-7060 (h. Phone Number) | 508-487-4675 (i. Fax Number) | bwitt@provincetown-ma.gov (j. Email Address)

3. Property owner (required if different from applicant): ☐ Check if more than one owner

(a. First Name) | (b. Last Name)

Town of Provincetown (c. Organization)

260 Commercial Street (d. Street Address)

Provincetown (e. City/Town) | MA (f. State) | 02657 (g. Zip Code)

(h. Phone Number) | (i. Fax Number) | (j. Email address)

4. Representative (if any):

Maria (a. First Name) | George (b. Last Name)

Apex Companies, LLC (c. Company)

18 Commerce Way Suite 2000 (d. Street Address)

Woburn (e. City/Town) | MA (f. State) | 01701 (g. Zip Code)

617-657-0952 (h. Phone Number) | 617-657-0201 (i. Fax Number) | maria.george@apexcos.com (j. Email address)

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

Exempt (a. Total Fee Paid) | Exempt (b. State Fee Paid) | Exempt (c. City/Town Fee Paid)

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A. General Information (continued)

6. General Project Description:

This roadway reconstruction project along Shank Painter Rd and portions of Route 6 includes a combination of pavement mill and overlay, full-depth pavement reconstruction, construction of a new shared use path, sidewalk construction, construction of new drainage piping and structures, and construction of a new drainage pump station at Court St to resolve a flooding issue.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☒ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

Maintenance and improvement of existing public roadways - 310 CMR 10.53(3)(f) and construction of public utilities (sewer and water) - 310 CMR 10.53(3)(d)

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Barnstable a. County	N/A Roadway b. Certificate # (if registered land)
N/A Roadway c. Book	N/A Roadway d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☒ Bordering Vegetated Wetland	689 1. square feet	693 2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet 3. cubic feet of flood storage lost	2. square feet 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☐ Riverfront Area	1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: _____ square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet _____ b. square feet within 100 ft. _____ c. square feet between 100 ft. and 200 ft. _____

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3. ☒ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment
	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☒ Land Subject to Coastal Storm Flowage	79,482 1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW | b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings | b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. ☒ Yes ☐ No

If yes, include proof of mailing or hand delivery of NOI to:

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

August 1, 2021
b. Date of map

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

c. Submit Supplemental Information for Endangered Species Review*

1. ☐ Percentage/acreage of property to be altered:

(a) within wetland Resource Area _____ percentage/acreage

(b) outside Resource Area _____ percentage/acreage

2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

(a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

(b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Provincetown
City/Town

C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☒ Separate MESA review ongoing. 25-19242 (a. NHESP Tracking #) 01/21/25 (b. Date submitted to NHESP)

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☐ Not applicable – project is in inland resource area only b. ☐ Yes ☒ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Bourne to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Plymouth to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☒ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Provincetown
City/Town

C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

      2. ☒ A portion of the site constitutes redevelopment

      3. ☒ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:

      1. ☐ Single-family house

      2. ☐ Emergency road repair

      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Provincetown
City/Town

D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Shank Painter Road and Route 6
a. Plan Title

Apex Companies, LLC
b. Prepared By

Ryan J. Paul
c. Signed and Stamped by

May 2025
d. Final Revision Date

Varies
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☒ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

N/A
2. Municipal Check Number

N/A
3. Check date

N/A
4. State Check Number

N/A
5. Check date

N/A
6. Payor name on check: First Name

N/A
7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Provincetown
City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date 7/30/25
3. Signature of Property Owner (if different)	4. Date 7/30/25
5. Signature of Representative (if any)	6. Date 7/30/2025

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

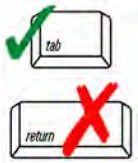
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Applicant Information

1. Location of Project:

Shank Painter Rd, Route 6, and Court St	Provincetown
a. Street Address	b. City/Town
N/A	Exempt
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Braden		Witt
a. First Name		b. Last Name
Town of Provincetown		
c. Organization		
260 Commercial Street		
d. Mailing Address		
Provincetown	MA	02657
e. City/Town	f. State	g. Zip Code
508-487-7060	508-487-4675	bwitt@provincetown-ma.gov
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name		b. Last Name
Town of Provincetown		
c. Organization		
260 Commercial Street		
d. Mailing Address		
Provincetown	MA	02657
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee

Step 5/Total Project Fee: Exempt

Step 6/Fee Payments:

Total Project Fee:	Exempt a. Total Fee from Step 5
State share of filing Fee:	Exempt b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	Exempt c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

APPENDIX B

Wetland Evaluation/Delineation Reports

PINEBROOK CONSULTING

May 7, 2025

ENVIRONMENTAL PARTNERS GROUP
18 Commerce Way, Suite 2000
Woburn, Massachusetts 01801
Attention: Ryan Paul and Maria George, Project Engineers

RE: Wetland Resource Area Delineation for Shared Bike Path Project
Shank Painter Road, Route 6 Westbound and Route 6 Eastbound
Provincetown, Massachusetts

Dear Ryan and Maria:

On March 18 and 20, 2025, I investigated the above-referenced roadways (hereinafter referred to as the Project Area) for the presence of wetland resource areas as defined under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131, Section 40) and the associated regulations, 310 CMR 10.00 (Regulations) and under the Town of Provincetown Wetlands Protection By-law (By-law). More specifically, Shank Painter Road from Route 6, in a southerly direction to Route 6A; the stretch of Route 6; westbound; from the intersection of Shank Painter Road, in the vicinity of Duck Pond, in a westerly direction to the start of Province Land Road, then from Province Land Road Route 6 in an easterly direction back to Shank Painter Road. The purpose of the investigation was to identify the wetland resource areas within the 100-foot buffer zone of the proposed Shared Bike Path Project proposed by the Town of Provincetown (Project). The following provides a description of my findings for each Project Location.

Shank Painter Road

The wetland resource areas identified in the vicinity of Shank Painter Road are defined under Section 10.55 of the Regulations and under the By-law as bordering vegetated wetland (BVW) and under the By-law as isolated wetland (IW). One (1) BVW and two (2) IW's were delineated with pink flags labeled WFA-1 thru WFA-10; WFB-1 thru WFB-9; and WFC-1 thru WFC-1 thru WFC-14. The BVW; located between #4 and #20 Shank Painter Road; is a depression defined by the upgradient slope that supports wetland, transitional and upland plant species and exhibits hydrological indicators such as stained/matted leaves, buttressed roots and saturated soils. The two IW's; one located in the vicinity of the Post Office and the other in the vicinity of Court Street; are both isolated/confined depressions that appear to have been designed as drainage basins, in that they capture runoff and drainage from Shank Painter Road and the upgradient

properties (see the attached sketch for the approximate location of the resource area flags). The boundary of both these resource areas is well-defined by the slope and the presence of wetland indicator plant species and hydrological indicators.

Route 6 Westbound

The wetland resource areas identified in the vicinity of Route 6 westbound are defined under Section 10.55 of the Regulations and under the By-law as BVW. Two BVW's were delineated pink flags labeled WFA-1 thru WFA-41; and WFB-1 thru WFB-11. The WFA wetland series commences in the vicinity of the Duck Pond Conservation Area and extends along Route 6 to where it continues over 100 feet from the Road; the WFB wetland series commences at a path that accesses Clapp's Pond Conservation Area, east of Goodrich Drive. Similar to the BVW on Shank Painter Road the boundary of the BVW's in the vicinity of Route 6 westbound is well-defined by the slope and the presence of wetland indicator plan species and hydrological indicators (see the attached sketches for the approximate location of the resource area flags).

Route 6 Eastbound

The wetland resource areas identified in the vicinity of Route 6 eastbound are defined under Section 10.55 of the Regulations and under the By-law as BVW and under the By-law as IW. The BVW; located upgradient of Shank Painter Pond; was delineated with flags labeled WFA-1 thru WFA-16. At the location where the boundary of the wetland continues over 100 feet from the Road the flags end and the flags commence where it heads back toward the Road. The WFA series wetland is well-defined by the extremely steep slope upgradient of the resource area (see the attached sketch for the location of these wetland flags). Two (2) IW's were identified and delineated with flags labeled WFB-1 thru WFB4 and WF-1 thru WFC-4. The IW's; located adjacent to the Road and the driveway that accesses #227; are small confined depression/basins that appear to be a result of the construction of the aforementioned driveway. Similar to the IW's on Shank Painter Road, the IW's capture runoff and drainage from the Road and, in this instance, also from the driveway (see the attached sketch for the approximate location of the resource area flags).

The boundary of the BVW's and IW's delineated at each Project location were identified by both the slope and/or the presence of wetland, transitional and upland plant species such as: red maple (Acer rubrum), white pine (Pinus strobus), red oak (Quercus faccata), pitch pine (Pinus rigida), tupelo (Nyssa sylvatica), white oak (Quercus alba) and pin oak (Quercus palustris) trees/saplings in the overstory; sweet pepperbush (Clehra alnifolia), red osier dogwood (Cornus stolonifera), hop hornbeam (Ostrya virginiana), huckleberry (Gaylussacia baccata),; however, the resopurce areas located off Route 6 west and es arrow-wood (Viburnum dentatum), highbush blueberry (Vaccinium corymbosum), green brier (Smilax glauca), bittersweet (Celastrus orbiculata), grape (Vitus, spp.), tartarian honeysuckle (Lonicera tartartica) and glossy buckthorn (Rhamnus frangula) in the

shrub/vine layer; and cinnamon fern (Osmunda cinnamomea), Massachusetts fern (Theylypteris simulata), sensitive fern (Onoclea sensibilis), Virginia creeper (Parthenocissus quinquefolia), teaberry (Gaultheria procumbens), Pennsylvnia sedge (Carex pensylvanicum), wrinkle-leaf goldenrod (Solidago rugosa), sphagnum moss (Sphagnum, spp.), poison ivy (Toxicodendron radicans) and tussock sedge (Carex, stricta) in the herbaceous layer. Where appropriate, and as requested, the Department of Environmental Protection (DEP) Wetland Determination Forms (Data Forms) have been prepared to confirm the location of the flags for the BVW's. Said Data Forms have been submitted under separate cover. It is my understanding that the resource area flags are to be surveyed and shown on a Plan to be submitted with a Notice of Intent (NOI) to the Provincetown Conservation Commission for a permit to conduct the proposed Project work.

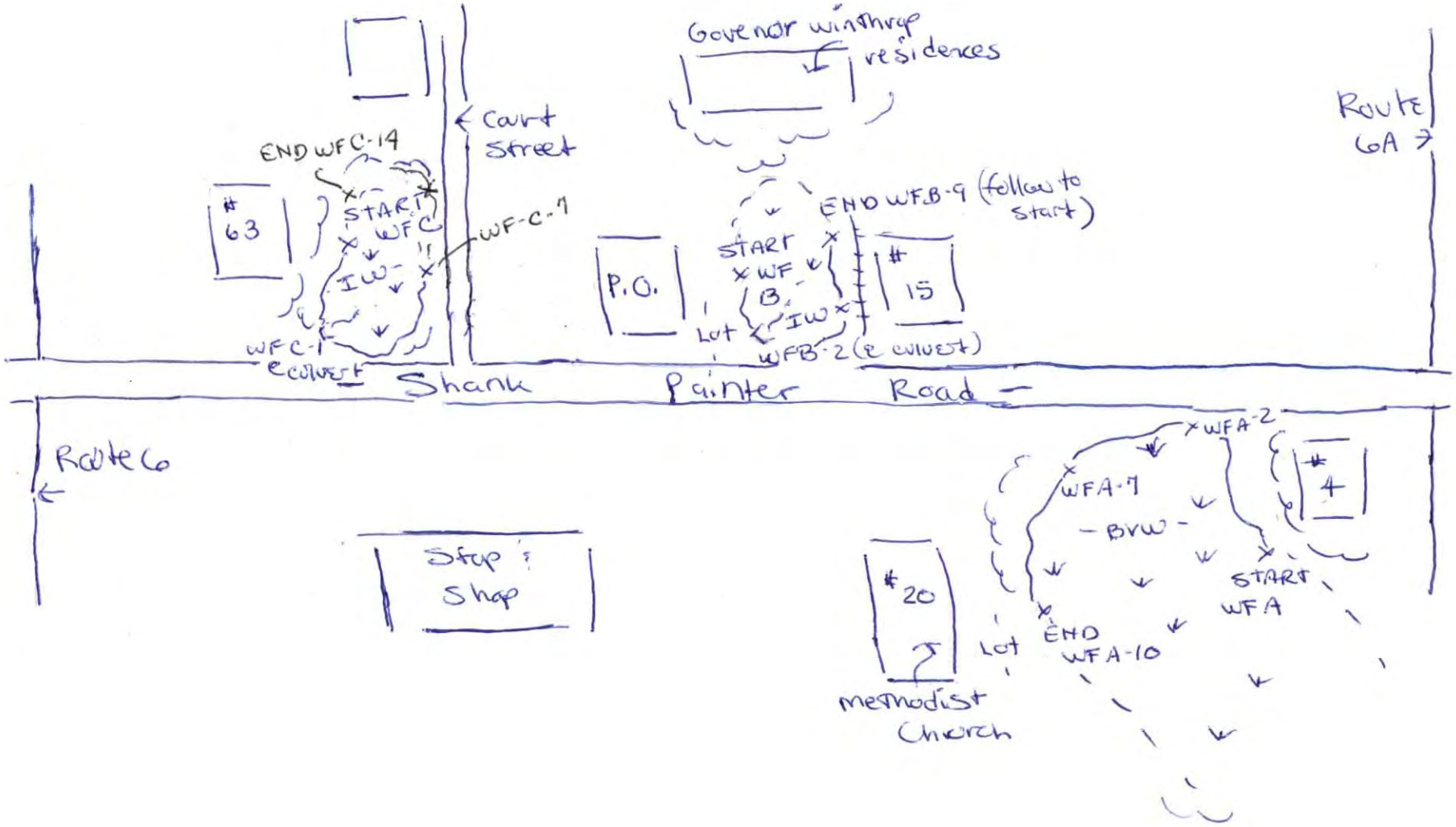
According to the most recent Massachusetts Natural Heritage Program (NHESP) Atlas (15th Edition) dated August 1, 2021, the Project roadways are not mapped as estimated and priority habitat for rare wildlife and/or rare species; however, the resource areas located off Route 6 west and east bound are mapped as priority and estimated habitat. There are no certified/mapped vernal pools within; in the vicinity of; the Project Locations.

If you have any questions regarding these findings and/or you need additional information, please feel free to call me at any time. I am glad I could assist you with this project, and let me know if I can be of any help in the future.

Sincerely,
PINEBROOK CONSULTING

Brooke Monroe
Environmental Scientist

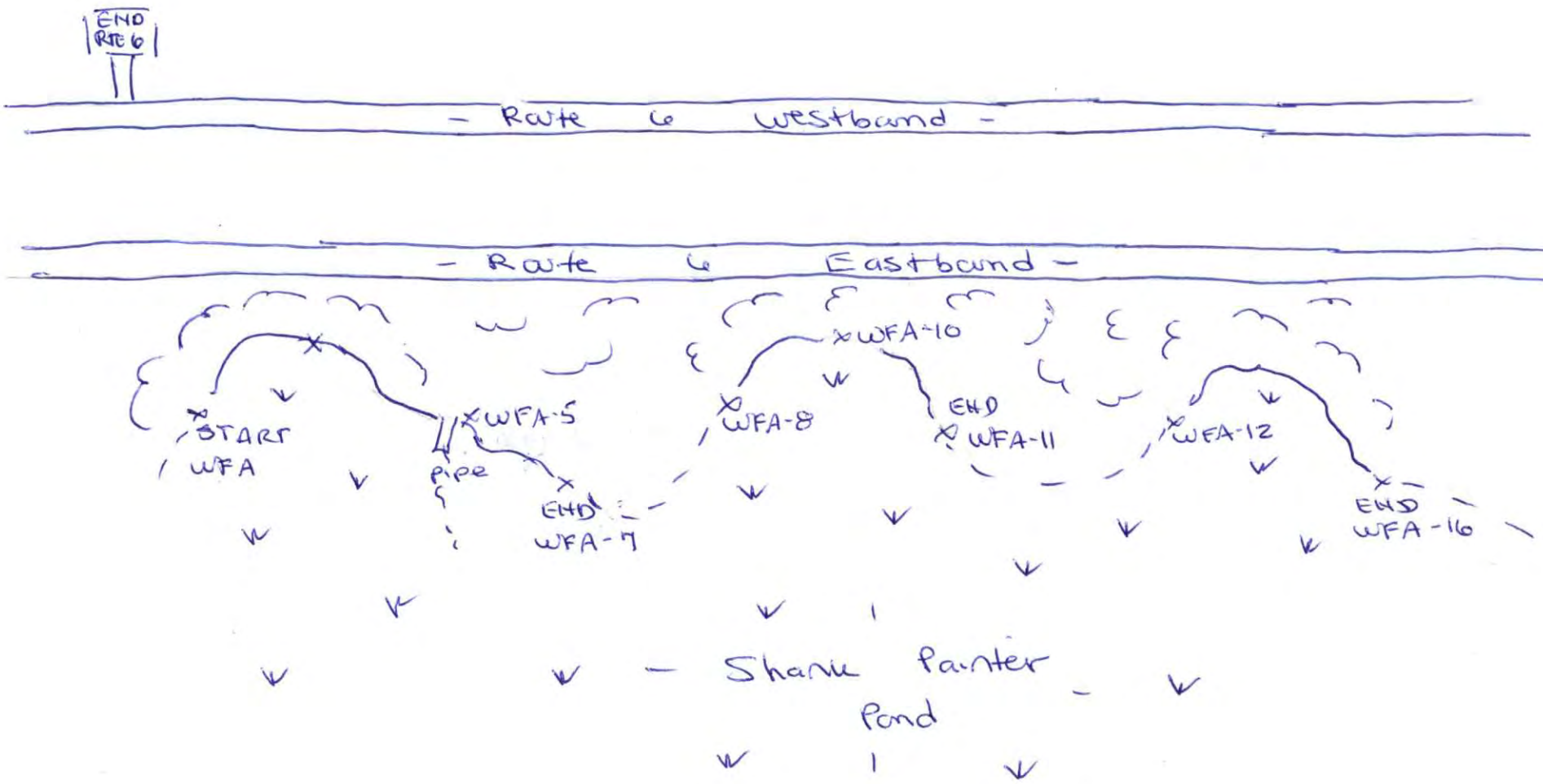
Wetland Resource Area Flags
- Shank Painter Road -
Provincetown, MA
3/18/2025



Proposal No. 608744-136412

(1)

Wetland Resource Area Flags
- Route 6 Eastbound -
Provincetown, MA
3/20/2025

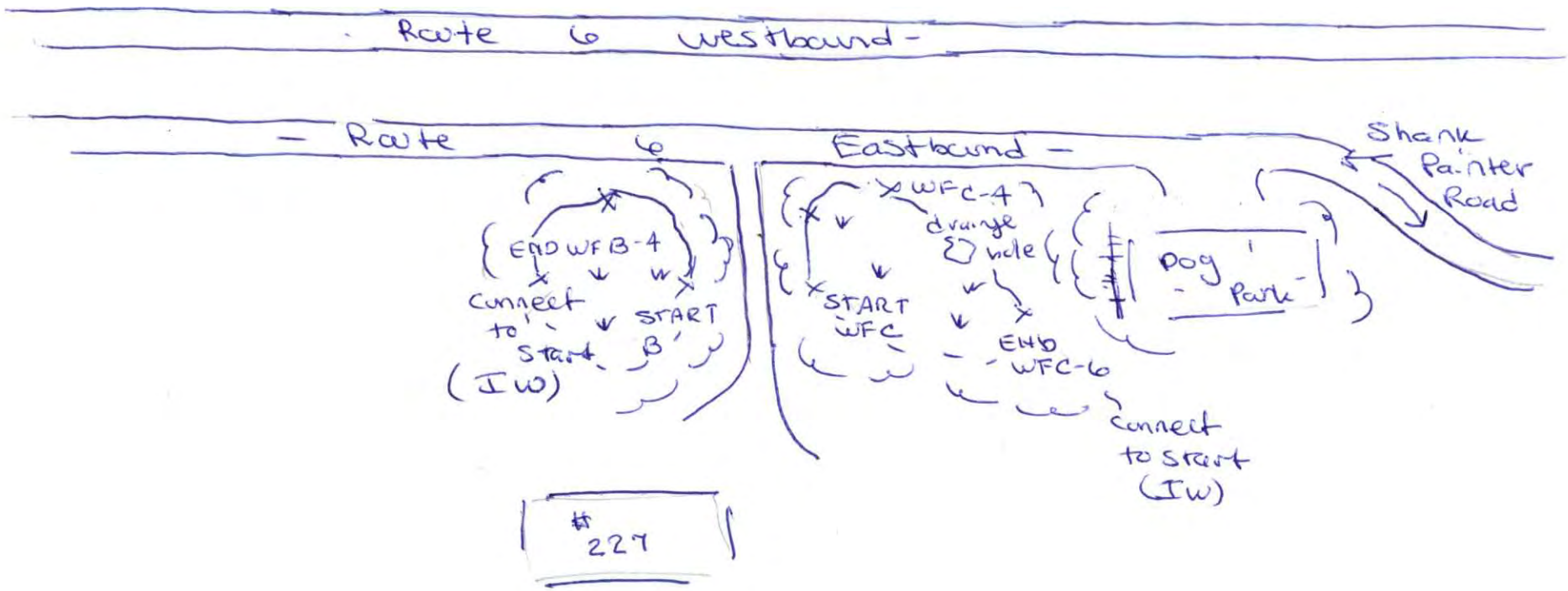


A00860 - 41

Proposal No. 608744-136412

(2)

Wetland Resarce Area Flags
- Route 6 East bound -
Provincetown, MA
3/20/2025 (cont from 1)

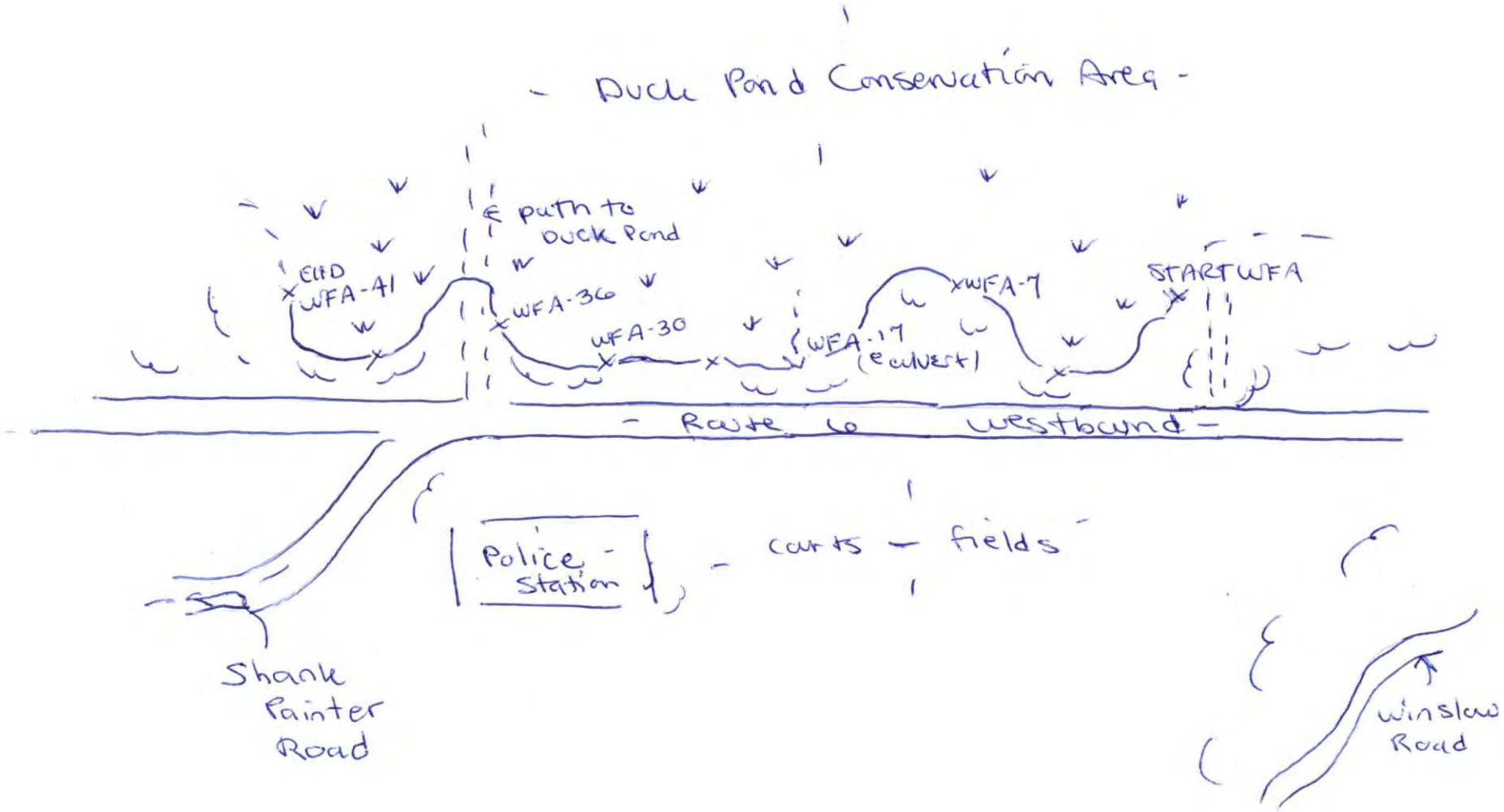


A00860 - 42

Proposal No. 608744-136412

(1)

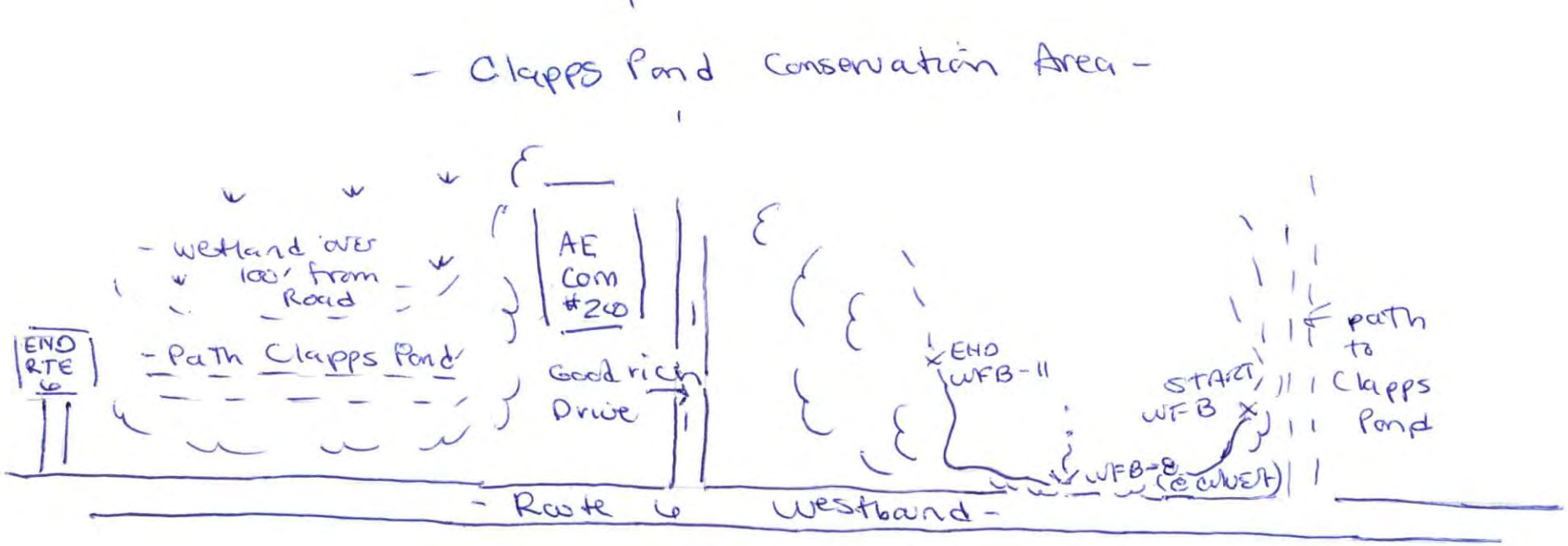
Wetland Resarce Area Flags
- Route 6 Westbound -
Provincetown, MA
3/20/2025



Proposal No. 608744-136412

(2)

Wetland Resarce Area Flags
Route 6 Westband
(Cont from 1)
Provincetown, MA
3/20/2025



A00860 - 44

Proposal No. 608744-136412

PINEBROOK CONSULTING

April 15, 2025

ENVIRONMENTAL PARTNERS GROUP (Apex Companies, LLC)
1900 Crown Colony Drive, Suite 402
Quincy, Massachusetts 02169
Attention: Ryan Paul and Maria George, Project Engineers.

RE: DEP Bordering Vegetated Wetland Delineation Field Data Forms,
Shank Painter Road, Route 6 Westbound and Route 6 Eastbound
Shared Bike Path Project, Provincetown, Massachusetts

Dear Ryan and Maria:

At your request; and at the request of Mass DOT; enclosed are the Department of Environmental Protection (DEP) Bordering Vegetated Wetland Determination Forms (Data Forms) for the wetland delineations conducted on the above-referenced Project roadways. The wetland delineations; conducted on March 18 and 20, 2025; identify bordering vegetated wetlands (BVW's) located at one location off Shank Painter Road, and different locations off Route 6 Westbound and Route 6 Eastbound. The Data Forms were prepared for three (3) upland and 3 wetland locations confirming the wetland flags at WF-A-6/WFA-7 (Shank Painter Road), WFA-10/WFA-11 and WFA-32/WFA-33 (Route 6 Westbound), with vegetative plots conducted at each location. Soil samples for the plots were deemed unnecessary, in that the BVW's are well-defined by the slope; the absence of hydrological indicators on the upland side of the plots; and the presence/dominance of hydrological indicators on the wetland side. No plots were conducted for the BVW off Route 6 Eastbound due the presence of the extremely steep slope and for the other aforementioned reasons above.

If you have any questions and/or you need additional information, please feel free to call me at any time. I am glad I could assist you with this project, and please let me know if you need any help in the future.

Sincerely,
PINEBROOK CONSULTING
Brooke Monroe
Environmental Scientist

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Shank Painter Road City/Town: Provincetown Sampling Date: 3/18/2025

Applicant/Owner: Town of Provincetown Sampling Point or Zone: up WF~~A~~-6/WF~~A~~-7

Investigator(s): Brooke Monroe Latitude / Longitude:

Soil Map Unit Name: Not available. NWI or DEP Classification: N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [ ] No [✓]	**Is the Sampled Area within a Wetland?**	**Yes** [ ] **No** [✓]
Hydric Soils criterion met?	Yes [ ] No [ ]		
Wetlands hydrology present?	Yes [ ] No [✓]		

Remarks, Photo Details, Flagging, etc.:

The location of the sampling is upgradient of WFA-6 and WFA-7. The wetland is well-defined by the slope and no hydrologic indicators are present on the upland side of the flags and the dominant plant species are, primarily, FACU.

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)
Saturation Present (including capillary fringe)?	Yes [ ]	No [✓]	Depth (inches)

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

The plot location is upgradient of WFA-6/WFA-7 on the top of the slope. There are no hydrologic indicators and/or a dominance of wetland plant species. The dominant plan species are FACU.

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

Sampling Point up WFA-6/WFA-7

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. quaking aspen	Populus tremuloides	FACU	38.0	Yes	No
2. black oak	Quercus velutina	FACU	3.0	No	No
3.					
4.					
5.					
6.					
7.					
8.					
9.					

41.0 = Total Cover

Shrub/Sapling Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. smooth sumac	Rhus glabra	FACU	63.0	Yes	No
2. multiflora rose	Rosa multiflora	FACU	20.5	Yes	No
3. glossy buckthorn	Rhamnus frangula	FAC	3.0	No	Yes
4.					
5.					
6.					
7.					
8.					
9.					

86.5 = Total Cover

Herb Stratum Plot size

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Pennsylvania sedge	Carex pensylvanicum	FACU	10.5	Yes	No
2. English ivy	Hedera helix	UPL	3.0	No	No
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

13.5 = Total Cover

Sampling Point up WFA-6/WFA-7

VEGETATION – continued.

Woody Vine Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. fox grape	Vitis labrusca	FACU	20.5	Yes	No
2. bittersweet	Celastrus orbiculata	FACU	3.0	No	No
3.					
4.					
			23.5 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW? Yes ☐ No ☑

Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants	Do wetland indicator plants make up ≥ 50% of dominant plant species?
			Yes ☐ No ☑

Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species	0	X 1	= 0.00
	FACW species	0	X 2	= 0.00
	FAC species	1	X 3	= 3.00
	FACU species	7	X 4	= 28.00
	UPL species	1	X 5	= 5.00
	Column Totals	(A) 9		(B) 36
	Prevalence Index	B/A = 4.00		Is the Prevalence Index ≤ 3.0? Yes ☑ No ☐

Wetland vegetation criterion met? Yes ☐ No ☑

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point up WFA-6/WFA-7

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: N/A Depth (inches): _____

Remarks: Surficial and/or deep soil samples were deemed unnecessary, in that the wetland/upland boundary is well-defined by the slope; there is an absence of hydrological indicators on the upland side; and there is the obvious presence of hydrological indicators on the wetland side.

Hydric Soils criterion met? Yes ☐ No ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Shank Painter Road City/Town: Provincetown Sampling Date: 3/18/2023

Applicant/Owner: Town of Provincetown Sampling Point or Zone: wet WFA-6/1WFA-7

Investigator(s): Brooke Monroe Latitude / Longitude:

Soil Map Unit Name: Not available. NWI or DEP Classification: BVW

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?**	**Yes [✓] No [ ]**
Hydric Soils criterion met?	Yes [✓] No [ ]		
Wetlands hydrology present?	Yes [✓] No [ ]		

Remarks, Photo Details, Flagging, etc.:

The plot location is downgradient of WFA-6 and WFA-7. Hydrological indicators (standing water, stained/matted leaves, saturated soils and buttressed roots) are evident and the wetland indicator plant species dominant.

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [✓]	No [ ]	Depth (inches) 2.00
Water Table Present?	Yes [ ]	No [ ]	Depth (inches)
Saturation Present (including capillary fringe)?	Yes [✓]	No [ ]	Depth (inches) 0.05

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[✓] Water-stained leaves	[ ] Hydrological records	[✓] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[✓] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[✓] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[✓] Moss trim lines	[✓] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[✓] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[✓] Trees with shallow root systems	[✓] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

Plot downgradient of the wetland flags. Obvious wetland conditions evident.

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

Sampling Point wet WFA-6/1WFA-7

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. red maple	Acer rubrum	FAC	38.0	Yes	Yes
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					

41.0 = Total Cover

Shrub/Sapling Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. glossy buckthorn	Rhamnus frangulla	FAC	3.0	No	Yes
2. winterberry	Ilex verticillata	FACW	20.5	Yes	Yes
3. smooth sumac	Rhus glabra	FACU	20.5	Yes	Yes
4. multiflora rose	Rosa multiflora	FACU	10.5	Yes	No
5. willow	Salix, spp.	FACW	10.5	Yes	Yes
6.					
7.					
8.					
9.					

65.0 = Total Cover

Herb Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. tussock sedge	Carex stricta	FACW	20.5	Yes	Yes
2. sensitive fern	Onoclea sensibilis	FACW	10.5	Yes	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

31.0 = Total Cover

Sampling Point wet WFA-6/1WFA-7

VEGETATION – continued.

Woody Vine Stratum — Plot size 30'					
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. fox grape	Vitus labrusca	FAC	3.0	No	Yes
2. bittersweet	Celastrus orbiculata	FACU	10.5	Yes	No
3. green brier	Smilax glauca	FAC	10.5	Yes	Yes
4.					
			24.0 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☐ No ☑
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species		X 1	= 0.00
	FACW species	4	X 2	= 8.00
	FAC species	3	X 3	= 9.00
	FACU species	3	X 4	= 12.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 10		(B) 29
	Prevalence Index	B/A = 2.90		Is the Prevalence Index ≤ 3.0? Yes ☑ No ☑
Wetland vegetation criterion met?		**Yes** ☑	**No** ☐	

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point wet WFA-6/1WFA-7

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks: Soil samples were deemed unnecessary, in that the presence of hydrological indicators; such as standing water, stained/matted leaves and buttressed roots; confirm hydric soils.

Hydric Soils criterion met? **Yes** ☑ **No** ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 6 Westbound City/Town: Provincetown Sampling Date: 3/20/2025

Applicant/Owner: Town of Provincetown Sampling Point or Zone: up WFA-10/WFA11

Investigator(s): Brooke Monroe Latitude / Longitude:

Soil Map Unit Name: Not available. NWI or DEP Classification: N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [ ] No [✓]	**Is the Sampled Area within a Wetland?**	**Yes [ ] No [✓]**
Hydric Soils criterion met?	Yes [ ] No [✓]		
Wetlands hydrology present?	Yes [ ] No [✓]		

Remarks, Photo Details, Flagging, etc.:

The location of the sampling is upgradient of WFA-10 and WFA-11. The wetland is well-defined by the gradual slope and no hydrologic indicators are present on the upland side of the flags and the dominant plant species are, primarily, FACU.

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)_____
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)_____
Saturation Present (including capillary fringe)?	Yes [ ]	No [✓]	Depth (inches)_____

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

The plot location is upgradient of WFA-10/WFA-11. There are no hydrologic indicators and/or a dominance of wetland plant species within the plot. The dominant plant species are FACU.

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

Sampling Point up WFA-10/WFA11

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. shortleaf pine	Pinus echinata	FACU	20.5	Yes	No
2. scarlet oak	Quercus coccinea	FACU	10.5	Yes	No
3. red maple	Acer rubrum	FAC	10.5	Yes	Yes
4.					
5.					
6.					
7.					
8.					
9.					

41.5 = Total Cover

Shrub/Sapling Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. scarlet oak	Quercus coccinea	FACU	3.0	No	No
2. multiflora rose	Rosa multiflora	FACU	10.5	Yes	No
3. glossy buckthorn	Rhamnus frangula	FAC	3.0	No	Yes
4. inkberry	Ilex glabra	FACW	3.0	No	Yes
5. black huckleberry	Gaylussacia baccata	FACU	20.5	Yes	No
6.					
7.					
8.					
9.					

40.0 = Total Cover

Herb Stratum Plot size

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Pennsylvania sedge	Carex pensylvanicum	FACU	10.5	Yes	No
2. teaberry	Gaultheria procumbens	FACU	10.5	Yes	No
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

21.0 = Total Cover

Sampling Point up WFA-10/WFA11

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. fox grape	Vitis labrusca	FACU	10.5	Yes	No
2. bittersweet	Celastrus orbiculata	FACU	20.5	Yes	No
3.		FACU		Yes	No
4.					
		31.0 = Total Cover			

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☐ No ☑
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species	0	X 1	= 0.00
	FACW species	0	X 2	= 0.00
	FAC species	2	X 3	= 6.00
	FACU species	9	X 4	= 36.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 11		(B) 42
	Prevalence Index	B/A = 3.82		Is the Prevalence Index ≤ 3.0? Yes ☑ No ☐
Wetland vegetation criterion met?		**Yes** ☐ **No** ☑		

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point up WFA-10/WFA11

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Location[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: N/A Depth (inches): _____

Remarks: Surficial and/or deep soil samples were deemed unnecessary, in that the wetland/upland boundary is defined by the absence of any hydrological indicators (stained/matted leaves, buttressed roots, saturated soils) on the upland side; and the presence of hydrological indicators and indicator plant species on the wetland side.

Hydric Soils criterion met? Yes ☐ No ☑

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 6 Westbound City/Town: Provincetown Sampling Date: 3/20/2023

Applicant/Owner: Town of Provincetown Sampling Point or Zone: wet WFA-10/WFA-11

Investigator(s): Brooke Monroe Latitude / Longitude:

Soil Map Unit Name: Not available. NWI or DEP Classification: BVW

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?**	**Yes [✓] No [ ]**
Hydric Soils criterion met?	Yes [✓] No [ ]		
Wetlands hydrology present?	Yes [✓] No [ ]		

Remarks, Photo Details, Flagging, etc.:

The plot location is downgradient of WFA-10 and WFA-11. Hydrological indicators (stained/matted leaves, saturated soils and buttressed roots) are evident and the wetland indicator plant species dominant.

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [✓]	No [ ]	Depth (inches) 0.50
Water Table Present?	Yes [ ]	No [ ]	Depth (inches)
Saturation Present (including capillary fringe)?	Yes [✓]	No [ ]	Depth (inches)

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[✓] Water-stained leaves	[ ] Hydrological records	[✓] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[✓] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[✓] Moss trim lines	[✓] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[✓] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[✓] Trees with shallow root systems	[✓] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

Plot downgradient of the wetland flags. Obvious wetland conditions are evident.

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

Sampling Point wet WFA-10/WFA-11

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. red maple	Acer rubrum	FAC	20.5	Yes	Yes
2. shortleaf pine	Pinus echinata	FACU	3.0	No	No
3. tupelo	Nyssa sylvatica	FACW	10.5	Yes	Yes
4.					
5.					
6.					
7.					
8.					
9.					

34.0 = Total Cover

Shrub/Sapling Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. sweet pepperbush	Clethra alnifolia	FAC	20.5	Yes	Yes
2. winterberry	Ilex verticillata	FACW	10.5	Yes	Yes
3. highbush blueberry	Vaccinium corymbosum	FACW	10.5	Yes	Yes
4. inkberry	Ilex glabra	FACW	38.0	Yes	Yes
5. black huckleberry	Gaylussacia baccata	FACU	10.5	Yes	No
6.					
7.					
8.					
9.					

90.0 = Total Cover

Herb Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. No herb dense leaf cover		FACW	20.5	Yes	Yes
2.		FACW	10.5	Yes	Yes
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

31.0 = Total Cover

Sampling Point wet WFA-10/WFA-11

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1.					
2. bittersweet	Celastrus orbiculata	FACU	10.5	Yes	No
3. green brier	Smilax glauca	FAC	10.5	Yes	Yes
4.					
		24.0	= Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?			Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants	Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☐ No ☑

Prevalence Index:	Total % Cover (all strata)	Multiply by:	Result
OBL species		X 1	= 0.00
FACW species	5	X 2	= 10.00
FAC species	3	X 3	= 9.00
FACU species	1	X 4	= 4.00
UPL species		X 5	= 0.00
Column Totals	(A) 9		(B) 23
Prevalence Index	B/A = 2.56		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☑

Wetland vegetation criterion met? Yes ☑ No ☐

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point wet WFA-10/WFA-11

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks: Soil samples were deemed unnecessary, in that the presence of hydrological indicators; stained/matted leaves, saturated solis and buttressed roots; confirm hydric soils. Dominant plant species are FACW.

Hydric Soils criterion met? Yes ☑ No ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 6 Westbound City/Town: Provincetown Sampling Date: 3/20/2025

Applicant/Owner: Town of Provincetown Sampling Point or Zone: up WFA-32WFA-33

Investigator(s): Brooke Monroe Latitude / Longitude: _____

Soil Map Unit Name: Not available. NWI or DEP Classification: N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [ ] No [✓]	**Is the Sampled Area within a Wetland?**	**Yes [ ] No [✓]**
Hydric Soils criterion met?	Yes [ ] No [ ]		
Wetlands hydrology present?	Yes [ ] No [✓]		

Remarks, Photo Details, Flagging, etc.:

The location of the sampling is upgradient of WFA-10 and WFA-11. The wetland is well-defined by the gradual slope and no hydrologic indicators are present on the upland side of the flags and the dominant plant species are, primarily, FACU.

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [ ]	No [✓]	Depth (inches)_____
Water Table Present?	Yes [ ]	No [✓]	Depth (inches)_____
Saturation Present (including capillary fringe)?	Yes [ ]	No [✓]	Depth (inches)_____

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[ ] Water-stained leaves	[ ] Hydrological records	[ ] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[ ] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[ ] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[ ] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[ ] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[ ] Trees with shallow root systems	[ ] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

The plot location is upgradient of WFA-32/WFA-33. There are no hydrologic indicators and/or a dominance of wetland plant species within the plot. The dominant plant species are FACU.

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

Sampling Point up WFA-32WFA-33

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. pitch pine	Pinus rigida	FACU	20.5	Yes	No
2. scarlet oak	Quercus coccinea	FACU	10.5	Yes	No
3. red maple	Acer rubrum	FAC	10.5	Yes	Yes
4. red oak	Quercus faccara	FACU	3.0	No	No
5. shortleaf pine	Pinus echinata	FACU	3.0	No	No
6.					
7.					
8.					
9.					

47.5 = Total Cover

Shrub/Sapling Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. scarlet oak	Quercus coccinea	FACU	3.0	No	No
2. multiflora rose	Rosa multiflora	FACU	3.0	No	No
3. glossy buckthorn	Rhamnus frangula	FAC	3.0	No	Yes
4. green brier	Smilax glauca	FAC	10.5	Yes	Yes
5. black huckleberry	Gaylussacia baccata	FACU	10.5	Yes	No
6.					
7.					
8.					
9.					

30.0 = Total Cover

Herb Stratum Plot size

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. Pennsylvania sedge	Carex pensylvanicum	FACU	10.5	Yes	No
2. teaberry	Gaultheria procumbens	FACU	38.0	Yes	No
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

48.5 = Total Cover

Sampling Point up WFA-32WFA-33

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. fox grape	Vitis labrusca	FACU	3.0	No	No
2. bittersweet	Celastrus orbiculata	FACU	20.5	Yes	No
3.					
4.					
			23.5 = Total Cover		

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?				Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants		Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☐ No ☑
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result
	OBL species	0	X 1	= 0.00
	FACW species	0	X 2	= 0.00
	FAC species	3	X 3	= 9.00
	FACU species	9	X 4	= 36.00
	UPL species		X 5	= 0.00
	Column Totals	(A) 12		(B) 45
	Prevalence Index	B/A = 3.75		Is the Prevalence Index ≤ 3.0? Yes ☑ No ☐
Wetland vegetation criterion met?		**Yes** ☐ **No** ☑		

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point up WFA-32WFA-33

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

Restrictive Layer (if observed) Type: N/A Depth (inches): _____

Remarks: Surficial and/or deep soil samples were deemed unnecessary, in that the wetland/upland boundary is defined by the slope at this location, absence of any hydrological indicators (stained/matted leaves, buttressed roots, saturated soils) on the upland side; and the presence of hydrological indicators and indicator plant species on the wetland side.

Hydric Soils criterion met? **Yes** ☐ **No** ☐

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: Route 6 Westbound City/Town: Provincetown Sampling Date: 3/20/2023

Applicant/Owner: Town of Provincetown Sampling Point or Zone: wet WFA-32WFA-33

Investigator(s): Brooke Monroe Latitude / Longitude:

Soil Map Unit Name: Not available. NWI or DEP Classification: BVW

Are climatic/hydrologic conditions on the site typical for this time of year? Yes [✓] No [ ] (If no, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] significantly disturbed? (If yes, explain in Remarks)

Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc.

Wetland vegetation criterion met?	Yes [✓] No [ ]	**Is the Sampled Area within a Wetland?**	**Yes [✓] No [ ]**
Hydric Soils criterion met?	Yes [✓] No [ ]		
Wetlands hydrology present?	Yes [✓] No [ ]		

Remarks, Photo Details, Flagging, etc.:

The plot location is downgradient of WFA-32and WFA-33. Hydrological indicators (stained/matted leaves, saturated soils and buttressed roots) are evident and the wetland indicator plant species dominant.

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes [✓]	No [ ]	Depth (inches) 0.50
Water Table Present?	Yes [ ]	No [ ]	Depth (inches)
Saturation Present (including capillary fringe)?	Yes [✓]	No [ ]	Depth (inches)

Wetland Hydrology Indicators

Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water
[✓] Water-stained leaves	[ ] Hydrological records	[✓] Direct observation of inundation
[ ] Evidence of aquatic fauna	[ ] Free water in a soil test hole	[ ] Drainage patterns
[ ] Iron deposits	[✓] Saturated soil	[ ] Drift lines
[ ] Algal mats or crusts	[✓] Water marks	[ ] Scoured areas
[ ] Oxidized rhizospheres/pore linings	[✓] Moss trim lines	[ ] Sediment deposits
[ ] Thin muck surfaces	[ ] Presence of reduced iron	[ ] Surface soil cracks
[ ] Plants with air-filled tissue (aerenchyma)	[✓] Woody plants with adventitious roots	[ ] Sparsely vegetated concave surface
[ ] Plants with polymorphic leaves	[✓] Trees with shallow root systems	[✓] Microtopographic relief
[ ] Plants with floating leaves	[ ] Woody plants with enlarged lenticels	[ ] Geographic position (depression, toe of slope, fringing lowland
[ ] Hydrogen sulfide odor		

Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):

Plot downgradient of the wetland flags and wetland conditions are evident.

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Form Revised July 2023

Sampling Point wet WFA-32WFA-33

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. red maple	Acer rubrum	FAC	38.0	Yes	Yes
2. shortleaf pine	Pinus echinata	FACU	10.5	Yes	No
3. tupelo	Nyssa sylvatica	FACW	10.5	Yes	Yes
4.					
5.					
6.					
7.					
8.					
9.					

59.0 = Total Cover

Shrub/Sapling Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. sweet pepperbush	Clethra alnifolia	FAC	20.5	Yes	Yes
2. winterberry	Ilex verticillata	FACW	10.5	Yes	Yes
3. highbush blueberry	Vaccinium corymbosum	FACW	10.5	Yes	Yes
4.					
5.					
6.					
7.					
8.					
9.					

41.5 = Total Cover

Herb Stratum Plot size 30'

Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1. sphagnum moss	Sphagnum, spp.	FACW	20.5	Yes	Yes
2. teaberry	Gaultheria procumbens	FACU	3.0	No	No
3. cinnamon fern	Osmunda cinnamomea	FACW	10.5	Yes	Yes
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

34.0 = Total Cover

Sampling Point wet WFA-32WFA-33

VEGETATION – continued.

Woody Vine Stratum	Plot size 30'				
Common name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indictor? (yes/no)
1.					
2. bittersweet	Celastrus orbiculata	FACU	10.5	Yes	No
3. green brier	Smilax glauca	FAC	3.0	No	Yes
4.					
		16.5 = Total Cover			

Rapid Test: Do all dominant species have an indicator status of OBL or FACW?			Yes ☐ No ☑
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants	Do wetland indicator plants make up ≥ 50% of dominant plant species? Yes ☐ No ☑

Prevalence Index:	Total % Cover (all strata)	Multiply by:	Result
OBL species		X 1	= 0.00
FACW species	5	X 2	= 10.00
FAC species	3	X 3	= 9.00
FACU species	1	X 4	= 4.00
UPL species		X 5	= 0.00
Column Totals	(A) 9		(B) 23
Prevalence Index	B/A = 2.56		Is the Prevalence Index ≤ 3.0? Yes ☐ No ☑

Wetland vegetation criterion met? Yes ☑ No ☐

Definitions of Vegetation Strata

Tree - Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height

Shrub / Sapling - Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall

Herb - All herbaceous (non-woody plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall

Woody vines - All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.0 %
6-15 %	10.5 %
15-25 %	20.5 %
26-50 %	38.0 %
51-75 %	63.0 %
76-95 %	85.5 %
96-100 %	98.0 %

Sampling Point wet WFA-32WFA-33

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Location[2]		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		**Indicators for Problematic Hydric Soils**
☐ Histosol (A1)	☐ Polyvalue Below Surface (S8)	☐ 2 cm Muck (A10)
☐ Histic Epipedon (A2)	☐ Thin Dark Surface (S9)	☐ 5 cm Mucky Peat or Peat (S3)
☐ Black Histic (A3)	☐ Loamy Gleyed Matrix (F2)	☐ Iron-Manganese Masses (F12)
☐ Hydrogen Sulfide (A4)	☐ Depleted Matrix (F3)	☐ Mesic Spodic (A17)
☐ Stratified Layers (A5)	☐ Redox Dark Surface (F6)	☐ Red Parent Material (F21)
☐ Depleted Below Dark Surface (A11)	☐ Depleted Dark Surface (F7)	☐ Very Shallow Dark Surface (F22)
☐ Thick Dark Surface (A12)	☐ Redox Depressions (F8)	
☐ Sandy Mucky Mineral (S1)		
☐ Sandy Gleyed Matrix (S4)		
☐ Sandy Redox (S5)		☐ Other (Include Explanation in Remarks)
☐ Stripped Matrix (S6)		
☐ Dark Surface (S7)		

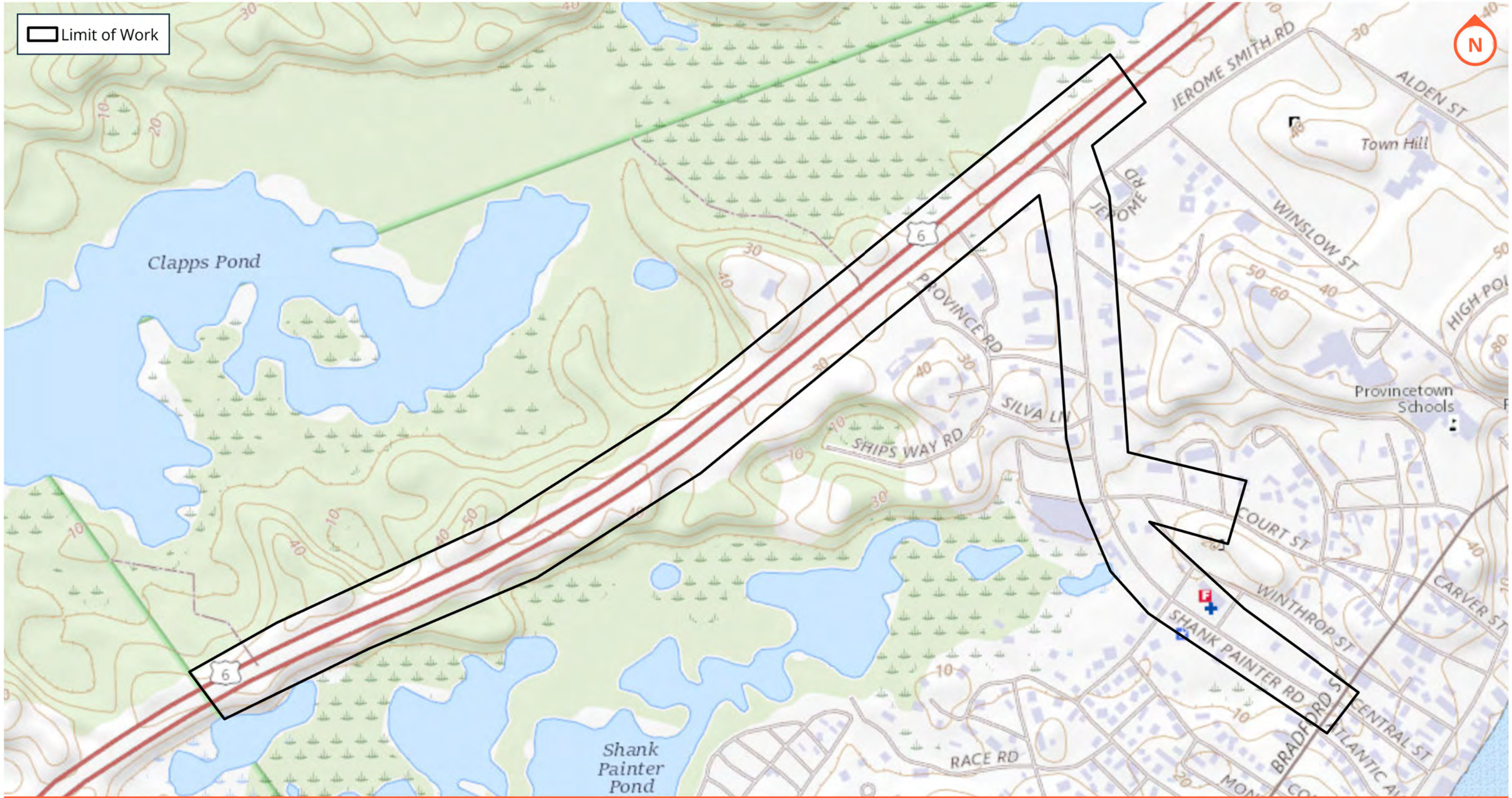
Restrictive Layer (if observed) Type: _____ Depth (inches): _____

Remarks: Soil samples were deemed unnecessary within the plot, in that the presence of hydrological indicators; stained/matted leaves, saturated soils and buttressed roots; confirm hydric soils and the dominant plant species are FACW.

Hydric Soils criterion met? **Yes** ☑ **No** ☐

APPENDIX C

Project GIS Mapping



ENVIRONMENTAL PARTNERS
— An Apex Company —

Figure 1
USGS Locus Map
Provincetown, MA
3/27/2024

0 500 1,000 2,000
Feet

I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

Disclaimer: This map is intended for planning purposes

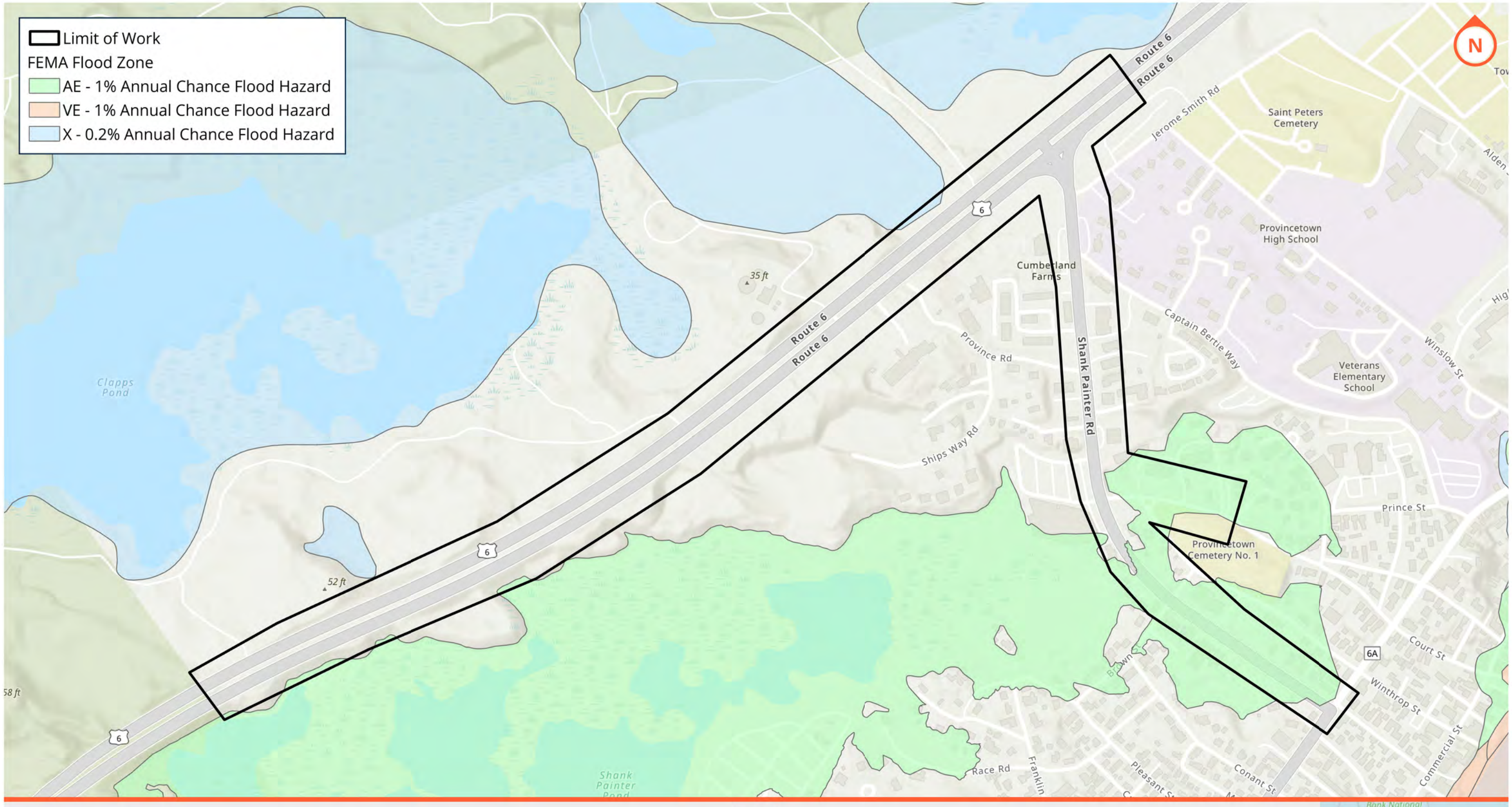


Figure 2

FEMA Flood Zones

Provincetown, MA

3/27/2024

0 500 1,000 2,000 Feet



ENVIRONMENTAL PARTNERS
— An Apex Company —

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Disclaimer: This map is intended for planning purposes

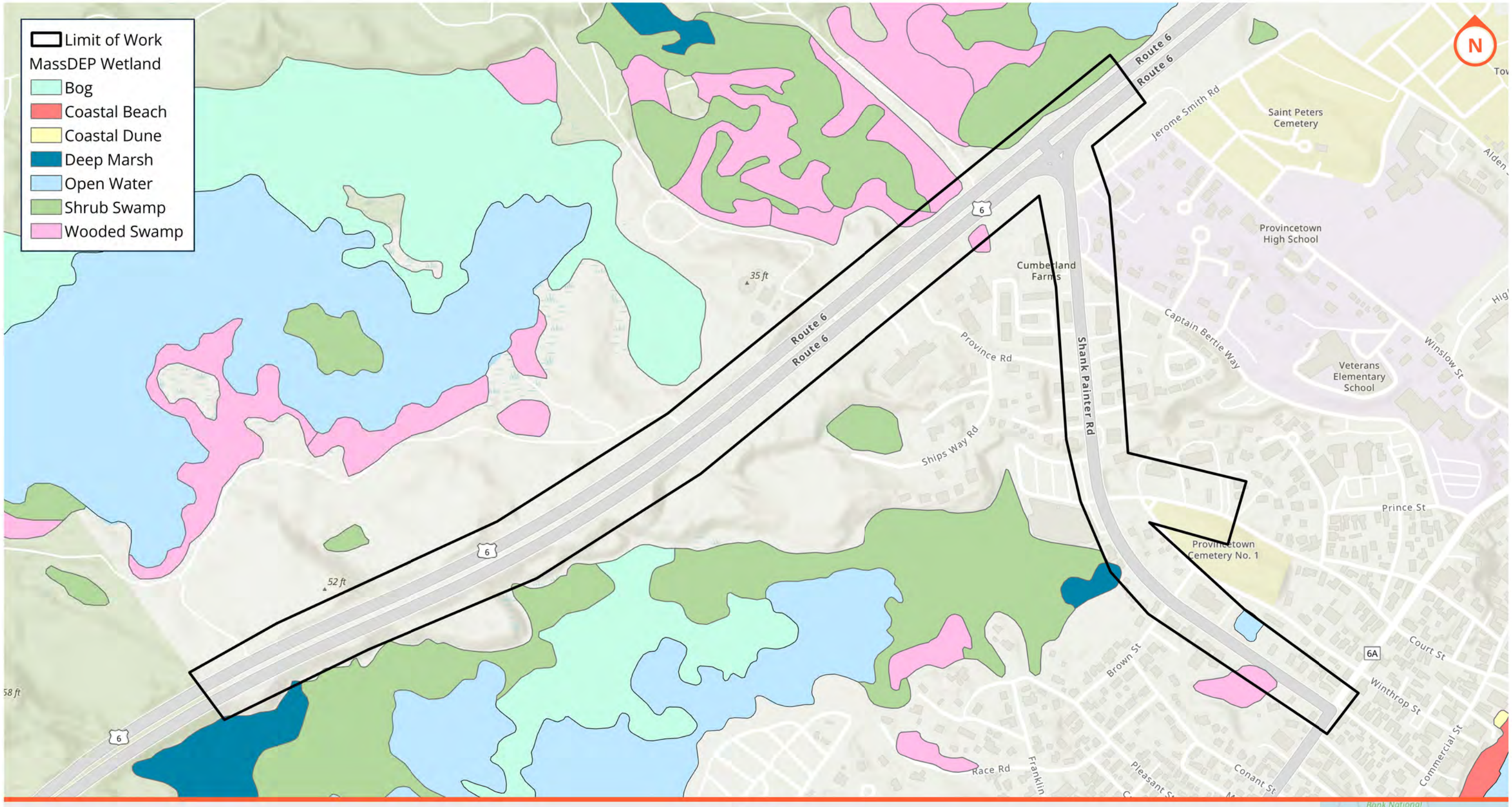


Figure 3

MassDEP Wetlands

Provincetown, MA

3/27/2024

ENVIRONMENTAL PARTNERS

— An Apex Company —

0 500 1,000 2,000 Feet

I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

Disclaimer: This map is intended for planning purposes

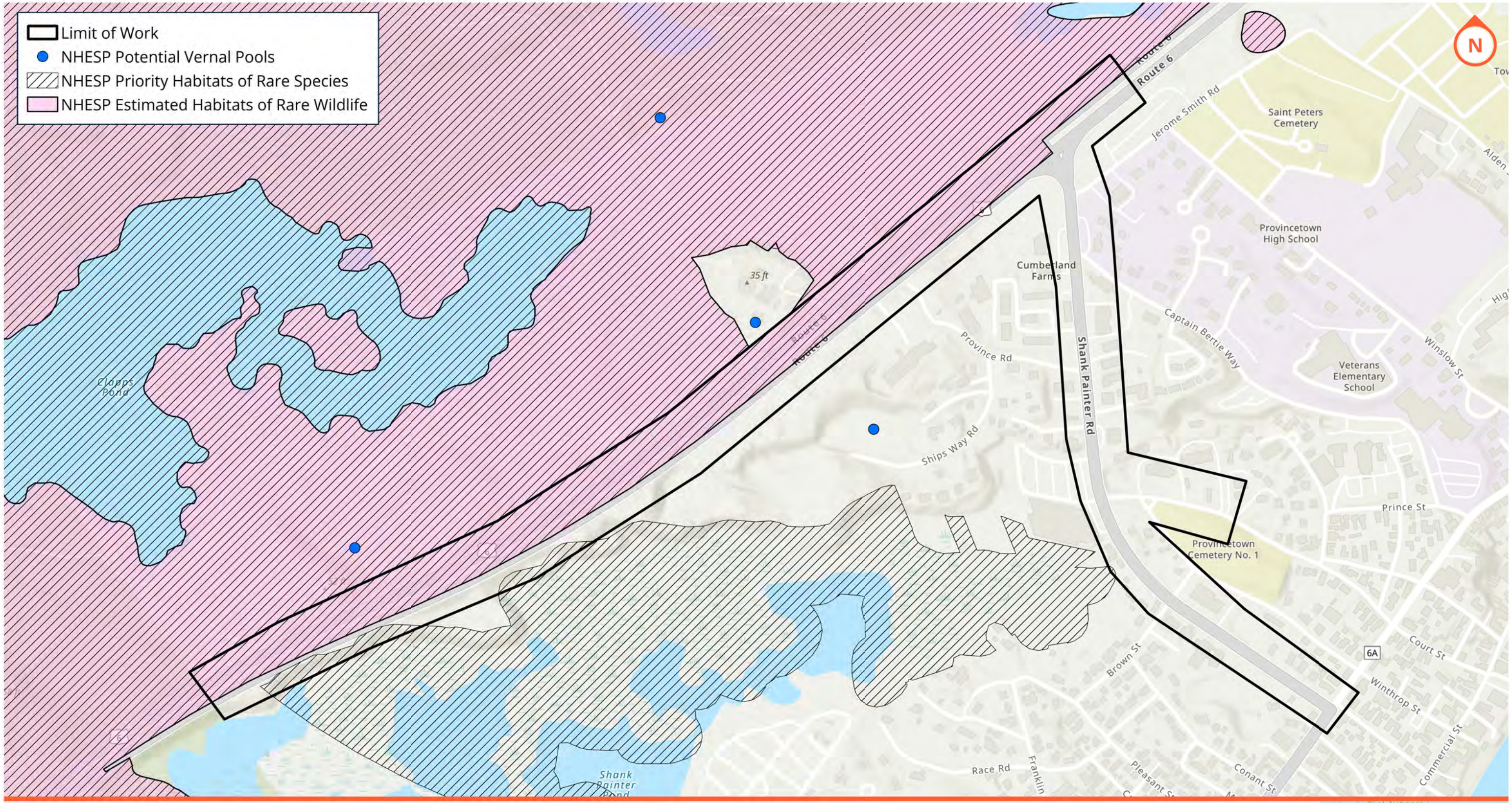


Figure 4

NHESP Habitats and Vernal Pools

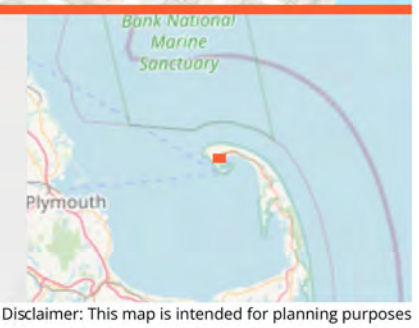
Provincetown, MA

3/27/2024

ENVIRONMENTAL PARTNERS

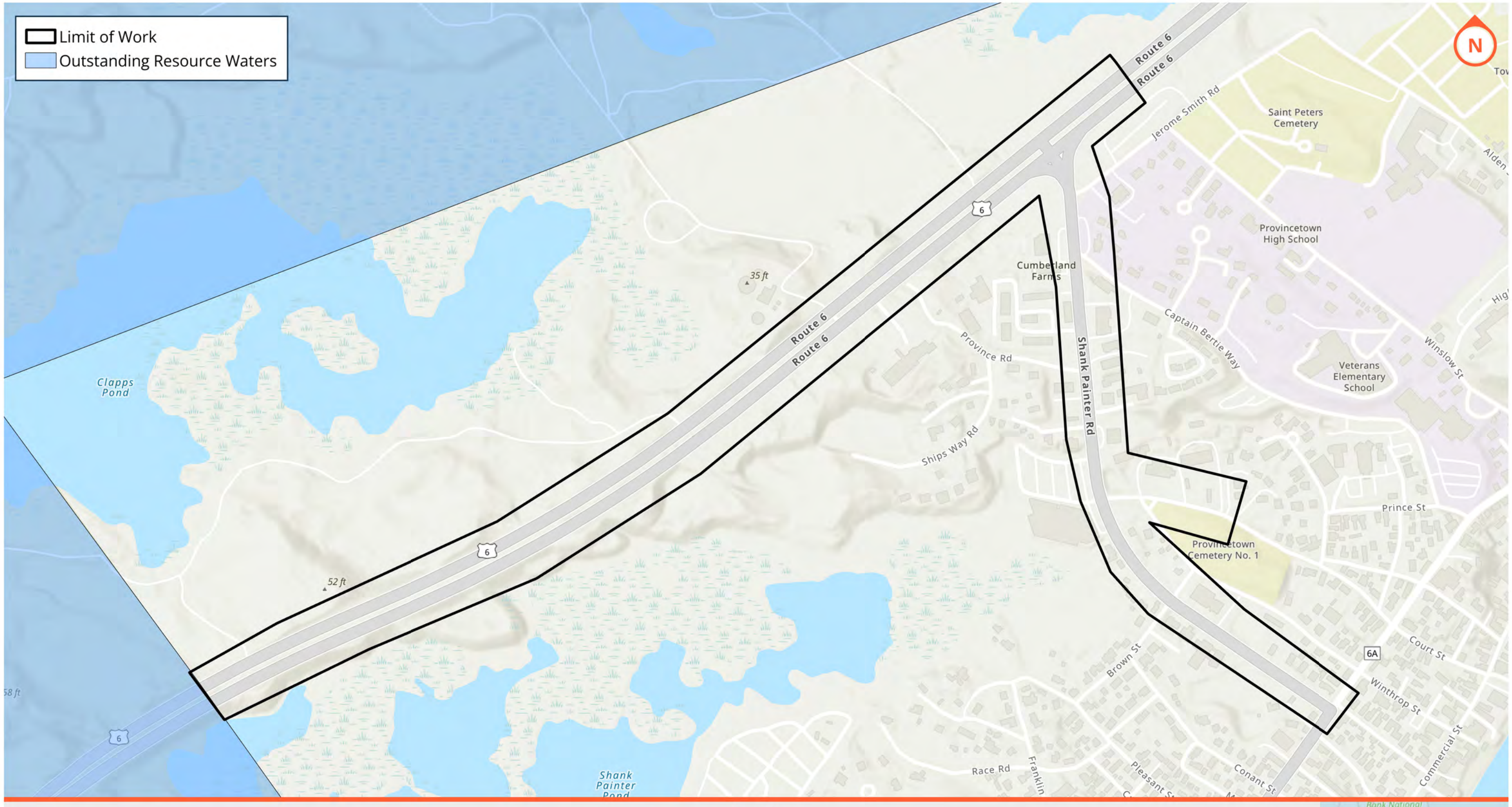
— An Apex Company —

0 500 1,000 2,000 Feet



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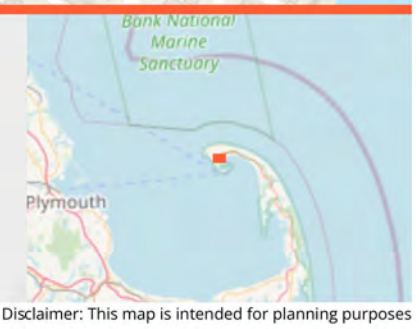
Disclaimer: This map is intended for planning purposes



ENVIRONMENTAL PARTNERS
— An Apex Company —

Figure 5
Outstanding Resource Waters
Provincetown, MA
3/27/2024

0 500 1,000 2,000
Feet



I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\4.7 Critical Areas Figure

Disclaimer: This map is intended for planning purposes

APPENDIX D

Permitting Design Plans

(Submitted Under Separate Cover)

APPENDIX E

Certified Abutters List and Notification Form

PROVINCETOWN CONSERVATION COMMISSION
OFFICE OF COMMUNITY DEVELOPMENT
TOWN OF PROVINCETOWN
260 COMMERCIAL STREET
PROVINCETOWN, MASSACHUSETTS 02657
(508)487-7020

Notice to Abutters

The Provincetown Conservation Commission will hold a Public Hearing at **6:00 p.m.** on Tuesday,

DATE (mm/dd/yyyy): ____August 19, 2025_____

to take place in the Judge Welsh Hearing Room, Town Hall, 260 Commercial Street, Provincetown, MA.

In accordance with the Wetlands Protection Act (M.G.L. Chapter 131, Section 40) and/or the Provincetown General Bylaw, Chapter 12, Wetlands Protection Bylaw, the following application has been filed with the Provincetown Conservation Commission:

☒ **Notice of Intent (NOI)**

☐ **Request for Determination of Applicability (RDA)**

☐ **Abbreviated Notice of Resource Area Delineation (ANRAD)**

☐ **Local Bylaw Filing**

☐ **Amended Order of Conditions** seeking an amendment to an already issued and active Order of Conditions under DEP File # _____

PROJECT ADDRESS: **_Route 6, Shank Painter Road, and Court Street_____**

APPLICANT &/OR OWNER: **_Provincetown Department of Public Works_____**

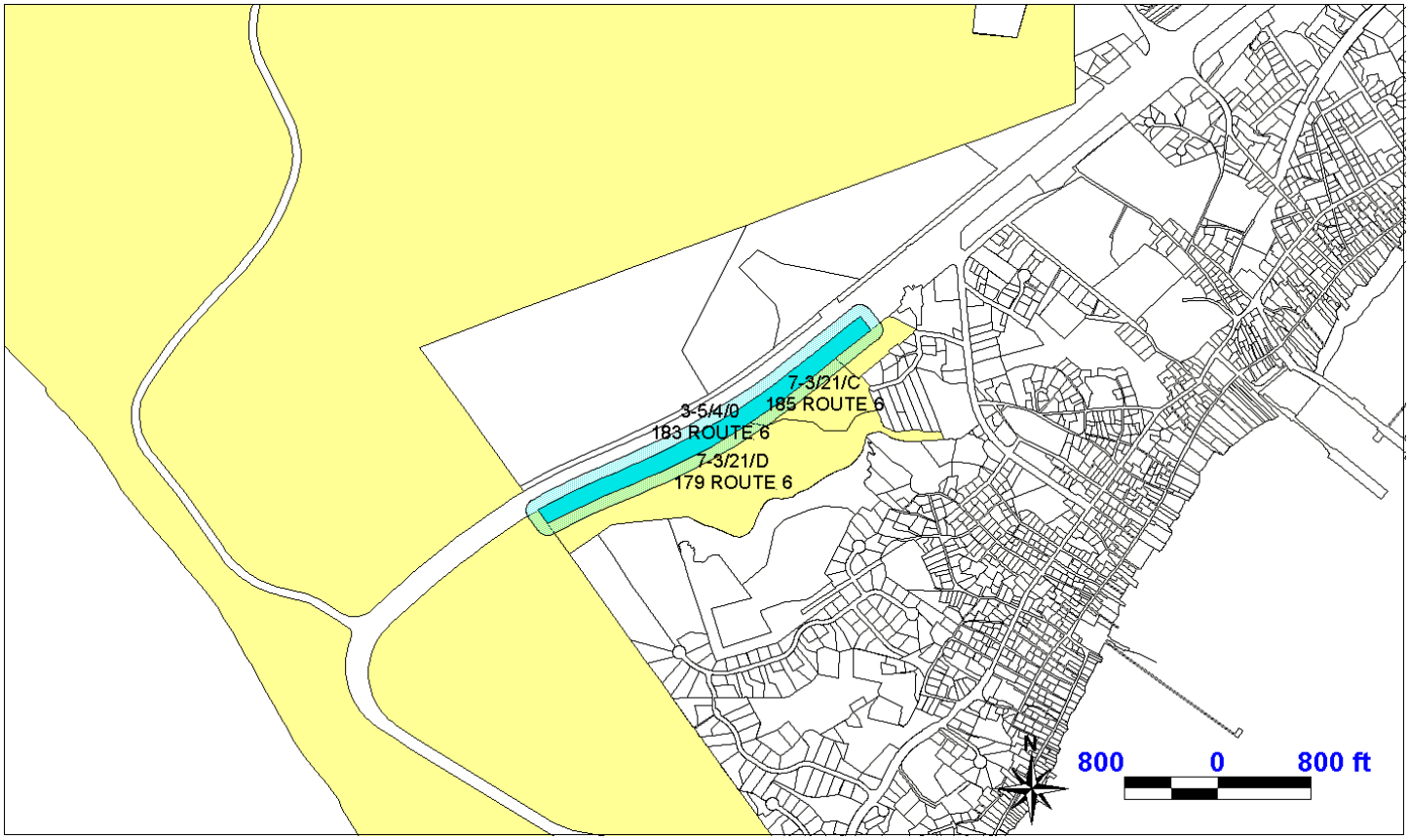
DESCRIPTION OF WORK BEING PROPOSED:

This roadway reconstruction project along Shank Painter Road and portions of Route 6 includes a combination of pavement mill and overlay, full depth pavement reconstruction, construction of a new shared use path, sidewalk construction, construction of new drainage piping and structures, and construction of a new drainage pump station at Court Street to resolve a flooding issue.

You have received this notice because you have been identified as an abutter of the property noted above. A link to this project application and all related documents and plans will be contained in the agenda for the public meeting which will be posted on the Town website (www.provincetown-ma.gov under Agendas and Minutes) no later than the Thursday before the Public Hearing. Documents and plans can also be viewed at the Community Development office located in the lower level of Town Hall, Monday through Thursday, between 9:00 am and 4:00 pm. If you are unable to attend the Public Hearing, opinion letters may be sent no later than 24 hours in advance of the hearing to: Melyssa Millett at Town Hall, 260 Commercial Street Provincetown, MA 02657 or by email at mmillett@provincetown-ma.gov.

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 3-5/4/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
24	1-8-40-0-E	CAPE COD NATIONAL SEASHORE U S DEPT OF INTERIOR	0 CAPE COD NATL SEASHORE	99 MARCONI SITE RD	WELLFLEET	MA	02667
100	3-5-4-0-E	COMMONWEALTH OF MASSACHUSETTS DIVISION FISHERIES & WILDLIFE	183 ROUTE 6	10 PARK PLAZA ROOM 6160	BOSTON	MA	02116
1446	7-3-21-0-R	SHANK PAINTER ASSOCIATES INC	207 ROUTE 6	PO BOX 638	PROVINCETOWN	MA	02657
1448	7-3-21-C-E	TOWN OF PROVINCETOWN CONSERVATION COMMISSION	185 ROUTE 6	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1449	7-3-21-D-E	PROVINCETOWN CONSERVATION TR	179 ROUTE 6	PO BOX 443	BARNSTABLE	MA	02630

1-8-40-0-E

CAPE COD NATIONAL SEASHORE
U S DEPT OF INTERIOR
99 MARCONI SITE RD
WELLFLEET, MA 02667

3-5-4-0-E

COMMONWEALTH OF MASSACHUSETTS
DIVISION FISHERIES & WILDLIFE
10 PARK PLAZA ROOM 6160
BOSTON, MA 02116

7-3-21-0-R

SHANK PAINTER ASSOCIATES INC
PO BOX 638
PROVINCETOWN, MA 02657

7-3-21-C-E

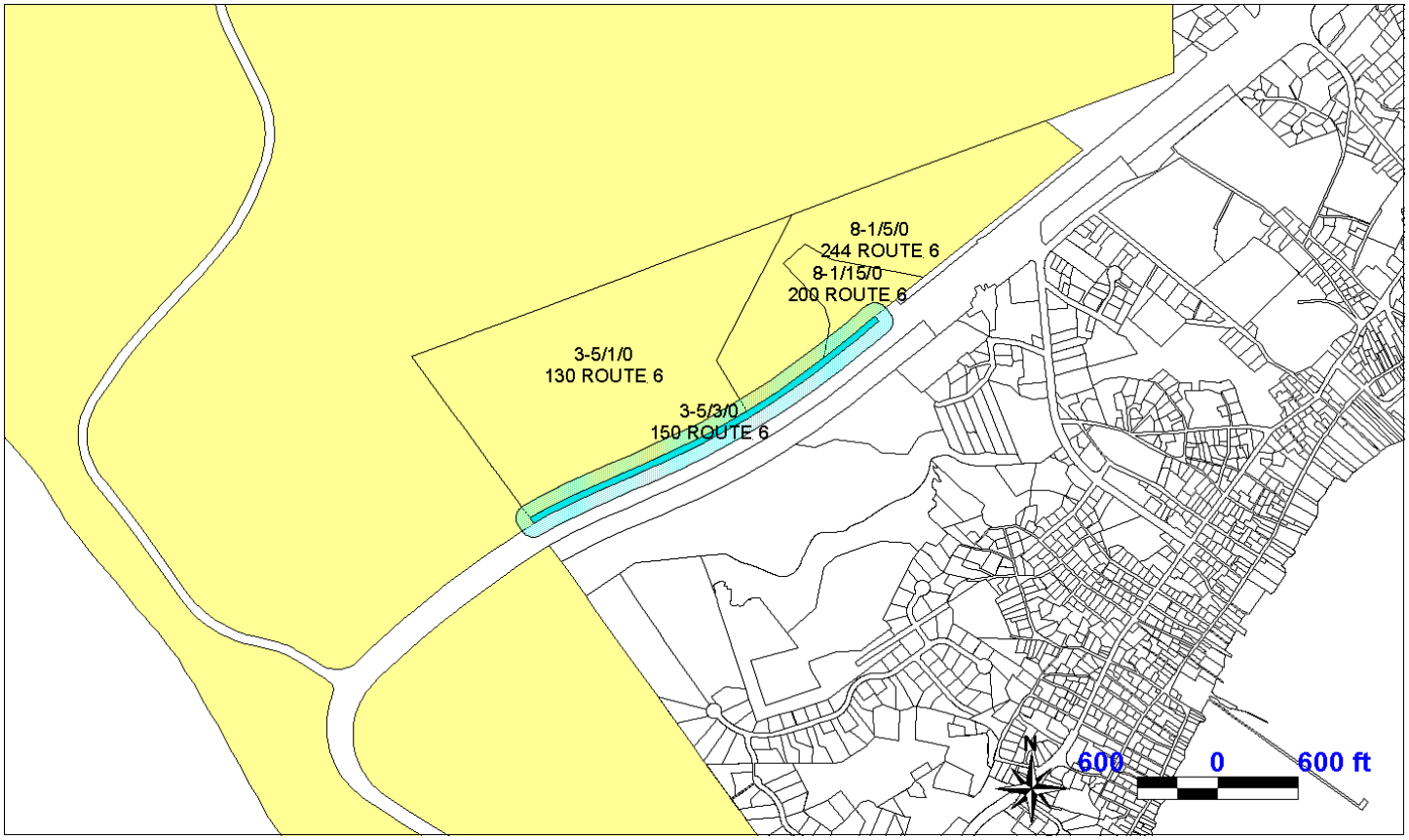
TOWN OF PROVINCETOWN
CONSERVATION COMMISSION
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-3-21-D-E

PROVINCETOWN CONSERVATION TR
PO BOX 443
BARNSTABLE, MA 02630

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 3-5/3/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
24	1-8-40-0-E	CAPE COD NATIONAL SEASHORE U S DEPT OF INTERIOR	0 CAPE COD NATL SEASHORE	99 MARCONI SITE RD	WELLFLEET	MA	02667
98	3-5-1-0-E	COMMONWEALTH OF MASSACHUSETTS DIVISION FISHERIES & WILDLIFE	130 ROUTE 6	100 CAMBRIDGE ST	BOSTON	MA	02202
99	3-5-3-0-E	COMMONWEALTH OF MASSACHUSETTS DIVISION FISHERIES & WILDLIFE	150 ROUTE 6	10 PARK PLAZA ROOM 6160	BOSTON	MA	02116
1599	8-1-5-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	244 ROUTE 6	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1609	8-1-15-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	200 ROUTE 6	260 COMMERCIAL ST	PROVINCETOWN	MA	02657

1-8-40-0-E

CAPE COD NATIONAL SEASHORE
U S DEPT OF INTERIOR
99 MARCONI SITE RD
WELLFLEET, MA 02667

3-5-1-0-E

COMMONWEALTH OF MASSACHUSETTS
DIVISION FISHERIES & WILDLIFE
100 CAMBRIDGE ST
BOSTON, MA 02202

3-5-3-0-E

COMMONWEALTH OF MASSACHUSETTS
DIVISION FISHERIES & WILDLIFE
10 PARK PLAZA ROOM 6160
BOSTON, MA 02116

8-1-5-0-E

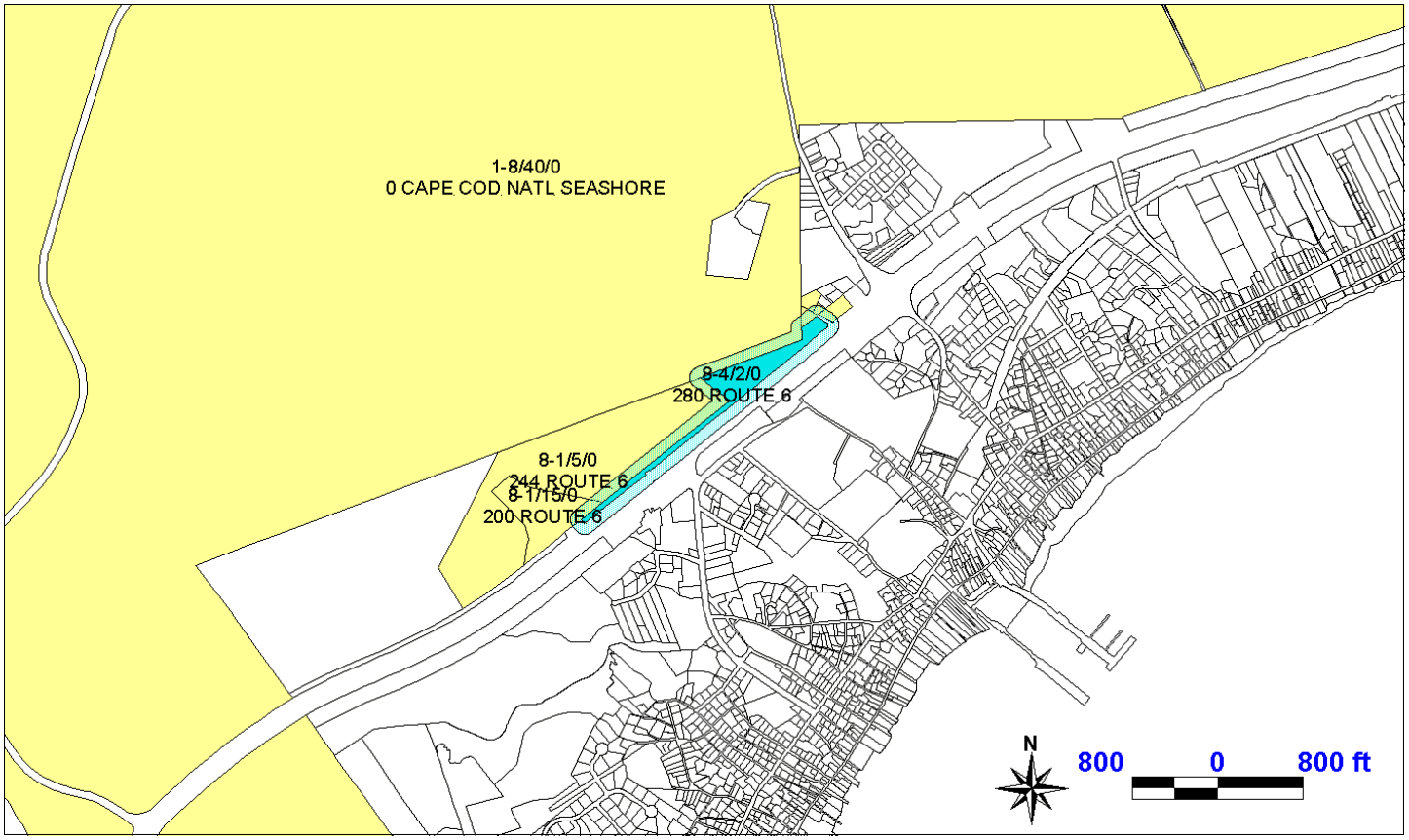
TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

8-1-15-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 8-4/2/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
24	1-8-40-0-E	CAPE COD NATIONAL SEASHORE U S DEPT OF INTERIOR	0 CAPE COD NATL SEASHORE	99 MARCONI SITE RD	WELLFLEET	MA	02667
1599	8-1-5-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	244 ROUTE 6	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1609	8-1-15-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	200 ROUTE 6	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1675	8-4-2-0-E	COMMONWEALTH OF MASSACHUSETTS DIVISION FISHERIES & WILDLIFE	280 ROUTE 6	10 PARK PLAZA ROOM 6160	BOSTON	MA	02116
1676	9-1-1-0-E	TOWN OF PROVINCETOWN CONSERVATION COMMISSION	2 SANDY HILL LN	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
9343	9-1-2--001-R	PATE LISA	6-U1 SANDY HILL LN	6-U1 SANDY HILL LN	PROVINCETOWN	MA	02657
9344	9-1-2--002-R	MANDEVILLE JOHN R	6-U2 SANDY HILL LN	6-U2 SANDY HILL LN	PROVINCETOWN	MA	02657
9345	9-1-2--003-R	LITVINOV YURIY ET UX INNA LITVINOVA	6-U3 SANDY HILL LN	6-U3 SANDY HILL LN	PROVINCETOWN	MA	02657
9346	9-1-2--004-R	DEGRUTTOLA DANIEL P	6-U4 SANDY HILL LN	6-U4 SANDY HILL LN	PROVINCETOWN	MA	02657
9347	9-1-2--005-R	EVANS JEFF T	6-U5 SANDY HILL LN	6-U5 SANDY HILL LN	PROVINCETOWN	MA	02657
9348	9-1-2--006-R	LAPORTE BARRY	6-U6 SANDY HILL LN	6-U6 SANDY HILL LN	PROVINCETOWN	MA	02657
9349	9-1-2--007-R	CAREY STEPHEN J	6-U7 SANDY HILL LN	6-U7 SANDY HILL LN	PROVINCETOWN	MA	02657
9350	9-1-2--008-R	CHOLY JOHN ET AL ELTON R CUTLER	6-U8 SANDY HILL LN	6-U8 SANDY HILL LN	PROVINCETOWN	MA	02657
9351	9-1-2--009-R	SAPINSKI PIOTR ET UX ANNA R SAPINSKA	6-U9 SANDY HILL LN	6-U9 SANDY HILL LN	PROVINCETOWN	MA	02657
9352	9-1-2--010-R	LEBLANC BRENDA	6-U10 SANDY HILL LN	6-U10 SANDY HILL LN	PROVINCETOWN	MA	02657

Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
9353	9-1-2--011-R	PATRICK NICOLAS C	6-U11 SANDY HILL LN	6-U11 SANDY HILL LN	PROVINCETOWN	MA	02657
9354	9-1-2--012-R	COVE STEVEN A ET UX JOANNE MILBURY COVE	6-U12 SANDY HILL LN	6-U12 SANDY HILL LN	PROVINCETOWN	MA	02657
1678	9-1-3-0-E	CARRIE A SEAMAN ANI SHELT INC	5 SANDY HILL LN	PO BOX 1374 5 SANDY HILL LN	PROVINCETOWN	MA	02657
1690	9-1-14-0-E	COMMONWEALTH OF MASSACHUSETTS DIVISION FISHERIES & WILDLIFE	300 ROUTE 6	10 PARK PLAZA ROOM 6160	BOSTON	MA	02116

1-8-40-0-E

CAPE COD NATIONAL SEASHORE
U S DEPT OF INTERIOR
99 MARCONI SITE RD
WELLFLEET, MA 02667

8-1-5-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

8-1-15-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

8-4-2-0-E

COMMONWEALTH OF MASSACHUSETTS
DIVISION FISHERIES & WILDLIFE
10 PARK PLAZA ROOM 6160
BOSTON, MA 02116

9-1-1-0-E

TOWN OF PROVINCETOWN
CONSERVATION COMMISSION
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

9-1-2--001-R

PATE LISA
6-U1 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--002-R

MANDEVILLE JOHN R
6-U2 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--003-R

LITVINOV YURIY ET UX
INNA LITVINOVA
6-U3 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--004-R

DEGRUTTOLA DANIEL P
6-U4 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--005-R

EVANS JEFF T
6-U5 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--006-R

LAPORTE BARRY
6-U6 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--007-R

CAREY STEPHEN J
6-U7 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--008-R

CHOLY JOHN ET AL
ELTON R CUTLER
6-U8 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--009-R

SAPINSKI PIOTR ET UX
ANNA R SAPINSKA
6-U9 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--010-R

LEBLANC BRENDA
6-U10 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--011-R

PATRICK NICOLAS C
6-U11 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-2--012-R

COVE STEVEN A ET UX
JOANNE MILBURY COVE
6-U12 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-3-0-E

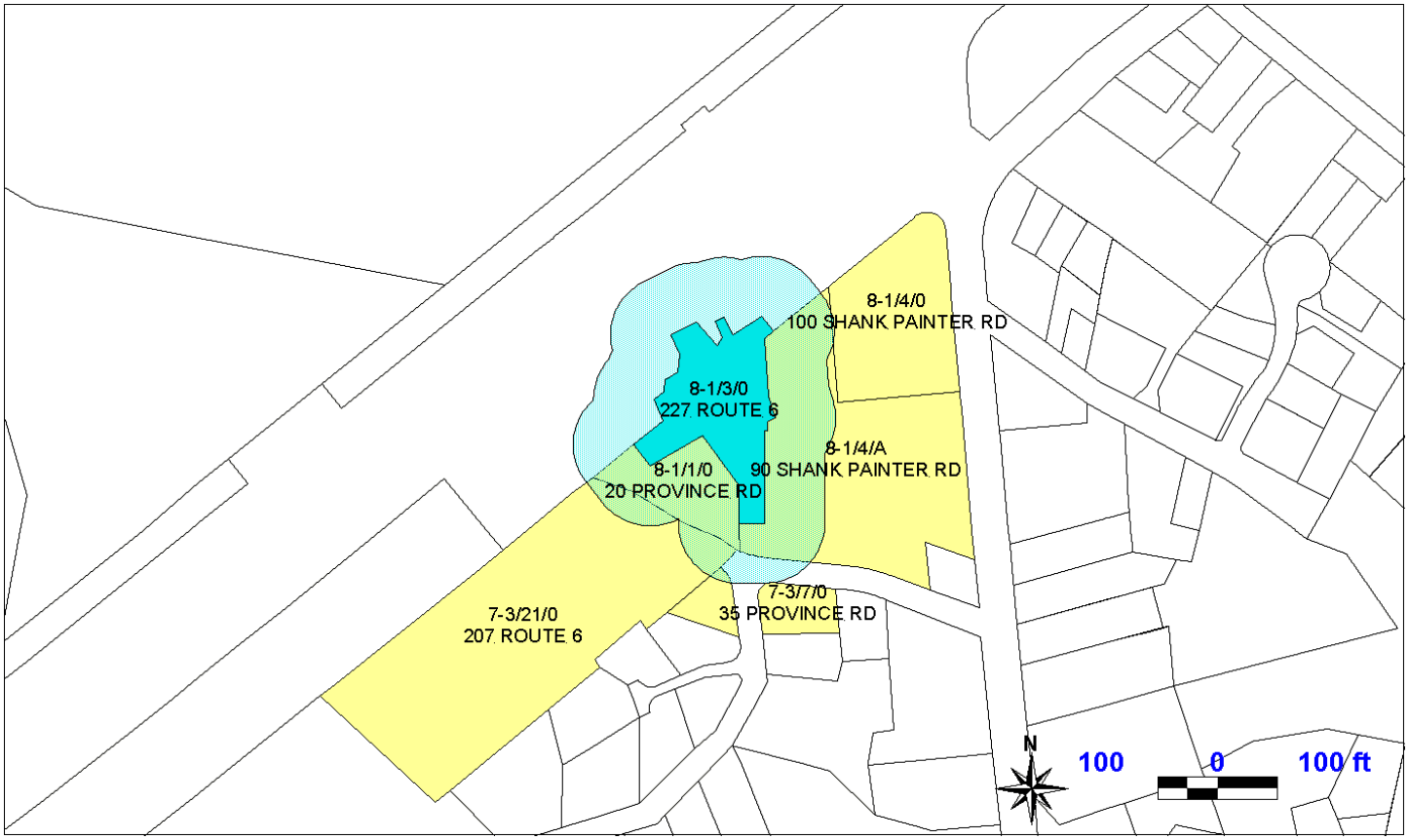
CARRIE A SEAMAN ANI SHELT INC
PO BOX 1374
5 SANDY HILL LN
PROVINCETOWN, MA 02657

9-1-14-0-E

COMMONWEALTH OF MASSACHUSETTS
DIVISION FISHERIES & WILDLIFE
10 PARK PLAZA ROOM 6160
BOSTON, MA 02116

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 8-1/3/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1430	7-3-7-0-R	GUREWITSCH JAY	35 PROVINCE RD	35 PROVINCE RD	PROVINCETOWN	MA	02657
1445	7-3-20-0-R	LCOF PROVINCETOWN CPBK HOUSING	52 SHIPS WAY RD	C/O LINCHRIS HOTEL CORP 225 WATER ST SUITE A-125	PLYMOUTH	MA	02360
1446	7-3-21-0-R	SHANK PAINTER ASSOCIATES INC	207 ROUTE 6	PO BOX 638	PROVINCETOWN	MA	02657
1595	8-1-1-0-R	ENCO REALTY INC	20 PROVINCE RD	PO BOX 91	PROVINCETOWN	MA	02657
1597	8-1-3-0-R	PRELUDE REALTY TR HALCYONE H TASHA TTEE	227 ROUTE 6	140 HARBOR BLUFF RD	HYANNIS	MA	02601
1598	8-1-4-0-R	OBSIDIAN ML 6 LLC	100 SHANK PAINTER RD	11995 EL CAMINO REAL	SAN DIEGO	CA	92130
4103	8-1-4-A-R	PROVINCE LANDING LP C/O RYAN LLC	90 SHANK PAINTER RD	ONE INTERNATIONAL PLACE 100 OLIVER ST STE 1840	BOSTON	MA	02110

7-3-7-0-R

GUREWITSCH JAY
35 PROVINCE RD
PROVINCETOWN, MA 02657

7-3-20-0-R

LCOF PROVINCETOWN CPBK HOUSING
C/O LINCHRIS HOTEL CORP
225 WATER ST SUITE A-125
PLYMOUTH, MA 02360

7-3-21-0-R

SHANK PAINTER ASSOCIATES INC
PO BOX 638
PROVINCETOWN, MA 02657

8-1-1-0-R

ENCO REALTY INC
PO BOX 91
PROVINCETOWN, MA 02657

8-1-3-0-R

PRELUDE REALTY TR
HALCYONE H TASHA TTEE
140 HARBOR BLUFF RD
HYANNIS, MA 02601

8-1-4-0-R

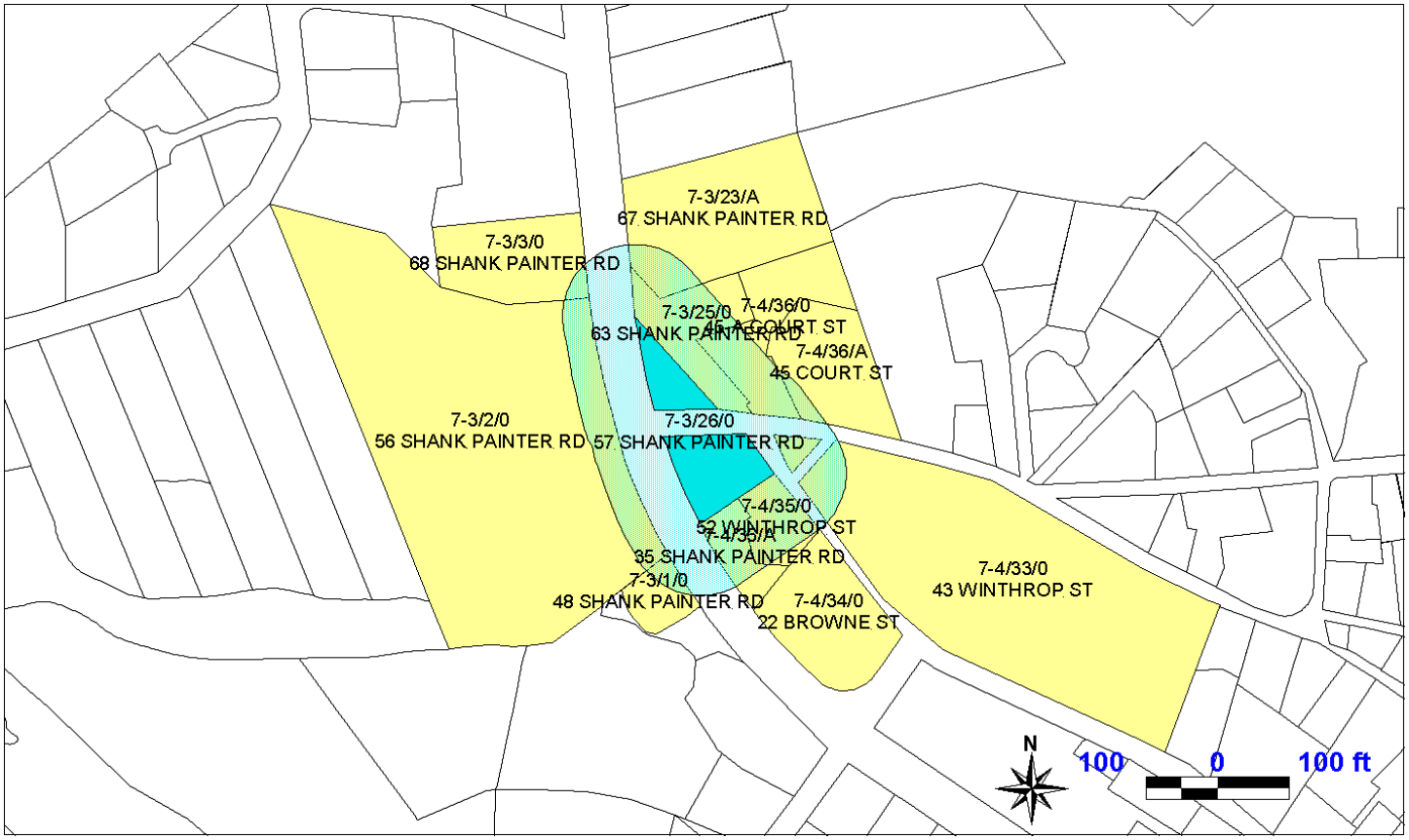
OBSIDIAN ML 6 LLC
11995 EL CAMINO REAL
SAN DIEGO, CA 92130

8-1-4-A-R

PROVINCE LANDING LP
C/O RYAN LLC
ONE INTERNATIONAL PLACE
100 OLIVER ST STE 1840
BOSTON, MA 02110

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 7-3/26/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1423	7-3-1-0-R	48 SHANKPAINTER LLC ET AL H PRESTON LLC	48 SHANK PAINTER RD	22 ROUNDWOOD RD	NEWTON	MA	02464
1424	7-3-2-0-R	SEAGULL REALTY TR CHARLES & HELEN SILVA TTEES	56 SHANK PAINTER RD	39 SHIPS WAY RD	PROVINCETOWN	MA	02657
1425	7-3-3-0-R	WEATHERING HEIGHTS REALTY TR CHARLES & HELEN T SILVA TTEES	68 SHANK PAINTER RD	39 SHIPS WAY RD	PROVINCETOWN	MA	02657
1454	7-3-23-A-R	KITTY'S REALTY TR CHERI SMITH TTEE	67 SHANK PAINTER RD	PO BOX 1986	PROVINCETOWN	MA	02657
1463	7-3-25-0-R	ATHINEOS ELIZABETH S ET AL EVANGELINE ATHINEOS	63 SHANK PAINTER RD	63 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1464	7-3-26-0-R	TRUCK FARM REALTY TRUST CHARLES & HELEN SILVA TTEES	57 SHANK PAINTER RD	39 SHIPS WAY RD	PROVINCETOWN	MA	02657
1505	7-4-33-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	43 WINTHROP ST	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1506	7-4-34-0-R	COWING BRIAN R ET UX RUTHANNE COWING	22 BROWNE ST	35 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1507	7-4-35-0-R	DUTRA RUTH W	52 WINTHROP ST	PO BOX 4	PROVINCETOWN	MA	02657
1508	7-4-35-A-R	COWING BRIAN R ET UX RUTH ANNE COWING	35 SHANK PAINTER RD	35 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1509	7-4-36-0-R	45A COURT ST LLC	45-A COURT ST	PO BOX 1367	PROVINCETOWN	MA	02657
1510	7-4-36-A-R	BWELL HOLDINGS INC	45 COURT ST	220 COMMERCIAL ST UNIT 2	PROVINCETOWN	MA	02657

7-3-1-0-R

48 SHANKPAINTER LLC ET AL
H PRESTON LLC
22 ROUNDWOOD RD
NEWTON, MA 02464

7-3-2-0-R

SEAGULL REALTY TR
CHARLES & HELEN SILVA TTEES
39 SHIPS WAY RD
PROVINCETOWN, MA 02657

7-3-3-0-R

WEATHERING HEIGHTS REALTY TR
CHARLES & HELEN T SILVA TTEES
39 SHIPS WAY RD
PROVINCETOWN, MA 02657

7-3-23-A-R

KITTY'S REALTY TR
CHERI SMITH TTEE
PO BOX 1986
PROVINCETOWN, MA 02657

7-3-25-0-R

ATHINEOS ELIZABETH S ET AL
EVANGELINE ATHINEOS
63 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-3-26-0-R

TRUCK FARM REALTY TRUST
CHARLES & HELEN SILVA TTEES
39 SHIPS WAY RD
PROVINCETOWN, MA 02657

7-4-33-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-4-34-0-R

COWING BRIAN R ET UX
RUTHANNE COWING
35 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-4-35-0-R

DUTRA RUTH W
PO BOX 4
PROVINCETOWN, MA 02657

7-4-35-A-R

COWING BRIAN R ET UX
RUTH ANNE COWING
35 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-4-36-0-R

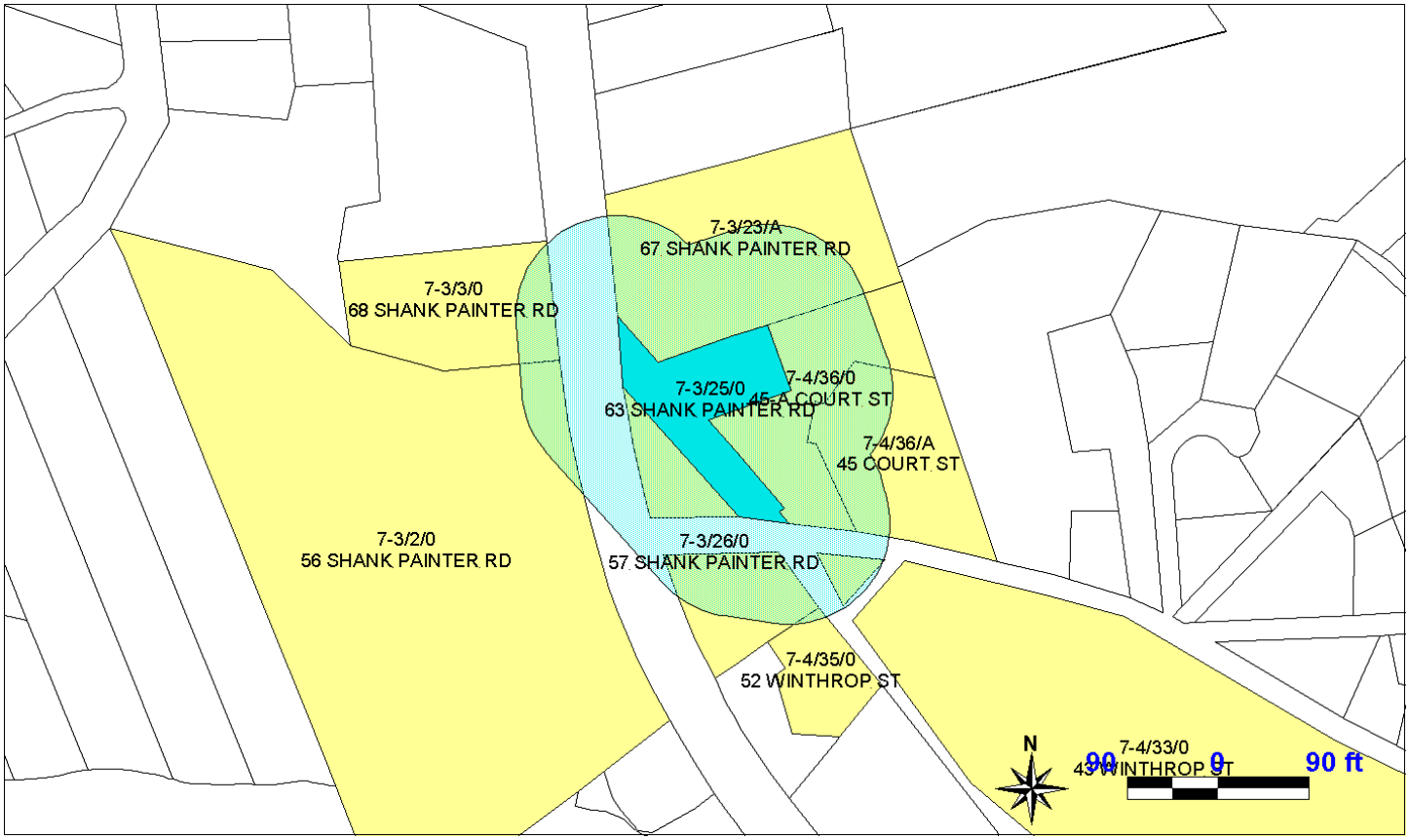
45A COURT ST LLC
PO BOX 1367
PROVINCETOWN, MA 02657

7-4-36-A-R

BWELL HOLDINGS INC
220 COMMERCIAL ST UNIT 2
PROVINCETOWN, MA 02657

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 7-3/25/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1424	7-3-2-0-R	SEAGULL REALTY TR CHARLES & HELEN SILVA TTEES	56 SHANK PAINTER RD	39 SHIPS WAY RD	PROVINCETOWN	MA	02657
1425	7-3-3-0-R	WEATHERING HEIGHTS REALTY TR CHARLES & HELEN T SILVA TTEES	68 SHANK PAINTER RD	39 SHIPS WAY RD	PROVINCETOWN	MA	02657
1454	7-3-23-A-R	KITTY'S REALTY TR CHERI SMITH TTEE	67 SHANK PAINTER RD	PO BOX 1986	PROVINCETOWN	MA	02657
1463	7-3-25-0-R	ATHINEOS ELIZABETH S ET AL EVANGELINE ATHINEOS	63 SHANK PAINTER RD	63 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1464	7-3-26-0-R	TRUCK FARM REALTY TRUST CHARLES & HELEN SILVA TTEES	57 SHANK PAINTER RD	39 SHIPS WAY RD	PROVINCETOWN	MA	02657
1505	7-4-33-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	43 WINTHROP ST	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1507	7-4-35-0-R	DUTRA RUTH W	52 WINTHROP ST	PO BOX 4	PROVINCETOWN	MA	02657
1509	7-4-36-0-R	45A COURT ST LLC	45-A COURT ST	PO BOX 1367	PROVINCETOWN	MA	02657
1510	7-4-36-A-R	BWELL HOLDINGS INC	45 COURT ST	220 COMMERCIAL ST UNIT 2	PROVINCETOWN	MA	02657

7-3-2-0-R

SEAGULL REALTY TR
CHARLES & HELEN SILVA TTEES
39 SHIPS WAY RD
PROVINCETOWN, MA 02657

7-3-3-0-R

WEATHERING HEIGHTS REALTY TR
CHARLES & HELEN T SILVA TTEES
39 SHIPS WAY RD
PROVINCETOWN, MA 02657

7-3-23-A-R

KITTY'S REALTY TR
CHERI SMITH TTEE
PO BOX 1986
PROVINCETOWN, MA 02657

7-3-25-0-R

ATHINEOS ELIZABETH S ET AL
EVANGELINE ATHINEOS
63 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-3-26-0-R

TRUCK FARM REALTY TRUST
CHARLES & HELEN SILVA TTEES
39 SHIPS WAY RD
PROVINCETOWN, MA 02657

7-4-33-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-4-35-0-R

DUTRA RUTH W
PO BOX 4
PROVINCETOWN, MA 02657

7-4-36-0-R

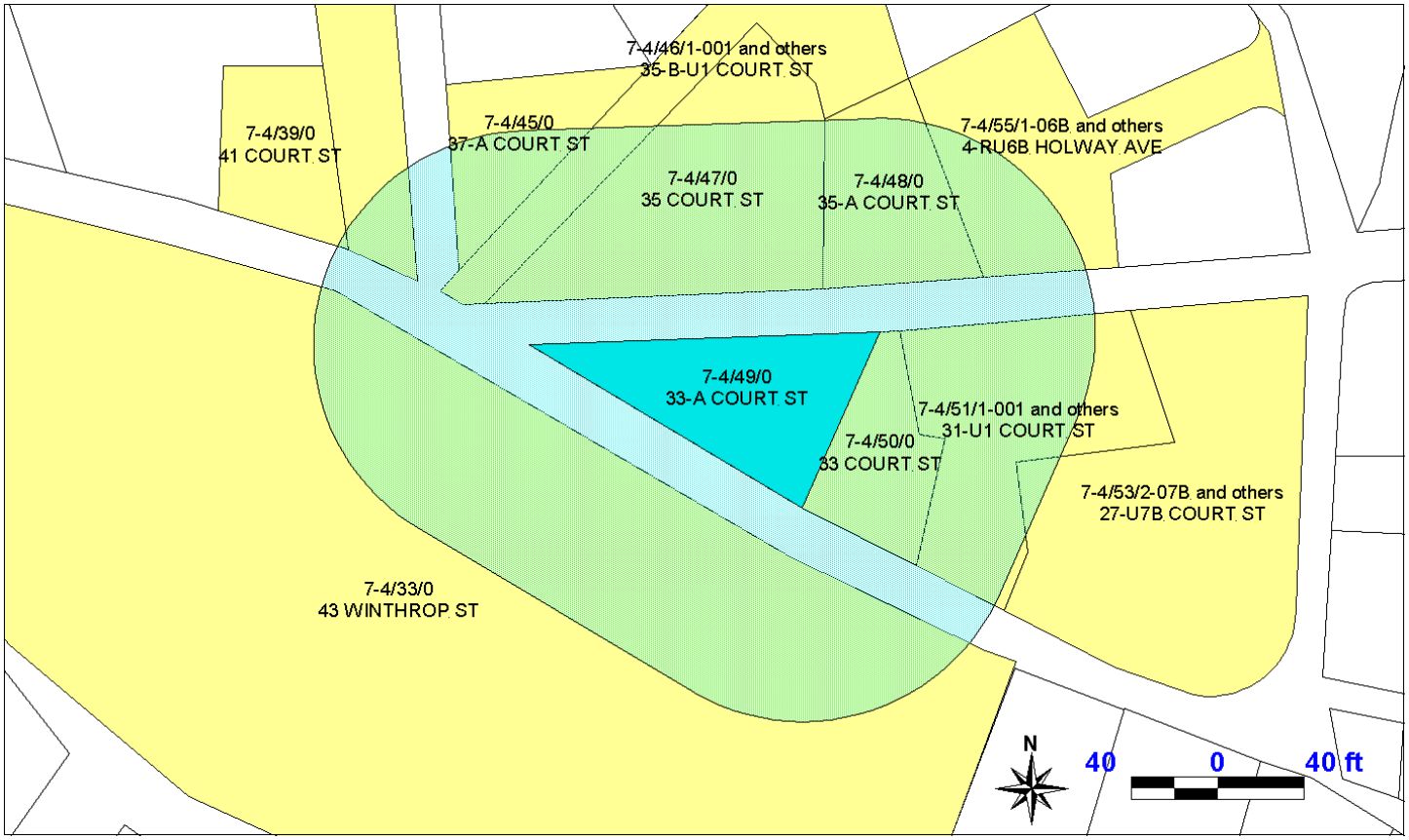
45A COURT ST LLC
PO BOX 1367
PROVINCETOWN, MA 02657

7-4-36-A-R

BWELL HOLDINGS INC
220 COMMERCIAL ST UNIT 2
PROVINCETOWN, MA 02657

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 7-4/49/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1505	7-4-33-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	43 WINTHROP ST	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1512	7-4-39-0-R	JAMES W SILVA	41 COURT ST	WARREN J SILVA ET UX PO BOX 71	PROVINCETOWN	MA	02657
1513	7-4-40-0-R	JAMES W SILVA	39 COURT ST	RITA JOAN SILVA PO BOX 71	PROVINCETOWN	MA	02657
1518	7-4-45-0-R	HAYNES CHRISTOPHER G ET UX KRISTY NARDONE	37-A COURT ST	5 ELIOT CR	JAMAICA PLAIN	MA	02130
10883	7-4-46-1-001-R	RICHARD R TEDESCO TR RICHARD R TEDESCO TTEE	35-B-U1 COURT ST	35-B-U1 COURT ST	PROVINCETOWN	MA	02657
10884	7-4-46-1-002-R	GERACI ANTHONY PAUL ET VIR REYNOLD CHUI	35-B-U2 COURT ST	201 EAST 25TH ST APT 1 A	NEW YORK	NY	10010
1520	7-4-47-0-R	LEWIS ZOE L V ET AL SHARON TOPPER	35 COURT ST	PO BOX 1516	PROVINCETOWN	MA	02657
1521	7-4-48-0-E	PROVINCETOWN HOUSING AUTHORITY	35-A COURT ST	44 HARRY KEMP WAY	PROVINCETOWN	MA	02657
1522	7-4-49-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	33-A COURT ST	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1523	7-4-50-0-E	PROVINCETOWN HOUSING AUTHORITY	33 COURT ST	44 HARRY KEMP WAY	PROVINCETOWN	MA	02657
9699	7-4-51-1-001-R	KUBICEK JOHN ET AL ROBERT ARROWOOD	31-U1 COURT ST	P O BOX 410	PROVINCETOWN	MA	02657
9700	7-4-51-2-002-R	KUBICEK JOHN ET AL ROBERT ARROWOOD	31-U2 COURT ST	P O BOX 410	PROVINCETOWN	MA	02657
9701	7-4-51-3-003-R	JOSEPH ANDREW ET VIR KARL GREGORY VEHLIES	31-U3 COURT ST	PO BOX 1469	PROVINCETOWN	MA	02657
1526	7-4-53-1-001-R	GIFFORD-TINKER MATTHEW	27-U1 COURT ST	100 W 67TH ST #4W	NEW YORK	NY	10023
1527	7-4-53-1-002-R	OLSON LESLIE L	27-U2 COURT ST	39 GROVE ST	QUINCY	MA	02169

Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1528	7-4-53-1-003-R	RUBIN SUELLEN	27-U3 COURT ST	1760 EAST 21ST ST	BROOKLYN	NY	11229
1529	7-4-53-1-004-R	THOMAS J SHEEHAN III REV TR THOMAS JOSEPH SHEEHAN III	27-U4 COURT ST	735 HARRISON AVE APT W-101	BOSTON	MA	02118-4902
1530	7-4-53-1-005-R	BRIAN T SARR TR	27-U5 COURT ST	83 SOUTH ST	BEDFORD	MA	01730
1531	7-4-53-2-07A-R	MELENDEZ RONALD D ET AL LAILTON DE SA GARCIA	27-U7A COURT ST	61 FELLSWAY EAST	MELROSE	MA	02176
1532	7-4-53-2-07B-R	DEAN JR STEVEN S ET AL JARED W SCHWOCHO	27-U7B COURT ST	599 LINWOOD AVE NE	ATLANTA	GA	30306
1533	7-4-53-3-006-R	WARNER DAVID J ET AL SAMEER T BHOITE	27-U6 COURT ST	287 K STREET	BOSTON	MA	02127
10100	7-4-53-Z-P0A-R	TREVOR'S TRAIL II LLC C/O THE CHATHAM MANOR LLC	27-PA COURT ST	720 MAIN ST	CHATHAM	MA	02633
10101	7-4-53-Z-P0B-R	TREVOR'S TRAIL II LLC	27-PB COURT ST	PO BOX 412	PROVINCETOWN	MA	02657
10102	7-4-53-Z-P0C-R	OLSON LESLIE L	27-PC COURT ST	39 GROVE ST	QUINCY	MA	02169
10103	7-4-53-Z-P0D-R	PUCK'S FOLLY LLC	27-PD COURT ST	2 REPUBLIC RD	N BILLERICA	MA	01864
10104	7-4-53-Z-P0E-R	BAKER GREGORY ET AL THOMAS WARD	27-PE COURT ST	1225 RESACA PL	PITTSBURGH	PA	15212
10105	7-4-53-Z-P0F-R	JP SULLIVAN SOLO 401K TR JOHN PATRICK SULLIVAN TTEE	27-PF COURT ST	62 BELLINGHAM ST	MENDON	MA	01756-1180
9893	7-4-55-1-06A-R	TERJESEN ROBERT J ET AL JAMES T RIEMAN	4-RU6A HOLWAY AVE	51 SOUTHVIEW CR	LAKE GROVE	NY	11755
9895	7-4-55-1-06B-R	STEPHEN DONNELLY REV TR STEPHEN M DONNELLY	4-RU6B HOLWAY AVE	505 W 47TH ST APT 1GS	NEW YORK	NY	10036-2450
9889	7-4-55-2-04A-R	NANDINI TALWAR LIVING TR (1/2) MADELINE ALBERT LIVING TR (1/2	4-RU4A HOLWAY AVE	31 STEVENS RD	MELROSE	MA	02176
9891	7-4-55-2-04B-R	KJM 2022 TRUST KEITH J MACDONALD TTEE	4-RU4B HOLWAY AVE	141 BEACONSFIELD RD #6	BROOKLINE	MA	02445

7-4-33-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-4-39-0-R

JAMES W SILVA
WARREN J SILVA ET UX
PO BOX 71
PROVINCETOWN, MA 02657

7-4-40-0-R

JAMES W SILVA
RITA JOAN SILVA
PO BOX 71
PROVINCETOWN, MA 02657

7-4-45-0-R

HAYNES CHRISTOPHER G ET UX
KRISTY NARDONE
5 ELIOT CR
JAMAICA PLAIN, MA 02130

7-4-46-1-001-R

RICHARD R TEDESCO TR
RICHARD R TEDESCO TTEE
35-B-U1 COURT ST
PROVINCETOWN, MA 02657

7-4-46-1-002-R

GERACI ANTHONY PAUL ET VIR
REYNOLD CHUI
201 EAST 25TH ST APT 1 A
NEW YORK, NY 10010

7-4-47-0-R

LEWIS ZOE L V ET AL
SHARON TOPPER
PO BOX 1516
PROVINCETOWN, MA 02657

7-4-48-0-E

PROVINCETOWN HOUSING AUTHORITY
44 HARRY KEMP WAY
PROVINCETOWN, MA 02657

7-4-49-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-4-50-0-E

PROVINCETOWN HOUSING AUTHORITY
44 HARRY KEMP WAY
PROVINCETOWN, MA 02657

7-4-51-1-001-R

KUBICEK JOHN ET AL
ROBERT ARROWOOD
P O BOX 410
PROVINCETOWN, MA 02657

7-4-51-2-002-R

KUBICEK JOHN ET AL
ROBERT ARROWOOD
P O BOX 410
PROVINCETOWN, MA 02657

7-4-51-3-003-R

JOSEPH ANDREW ET VIR
KARL GREGORY VEHLIES
PO BOX 1469
PROVINCETOWN, MA 02657

7-4-53-1-001-R

GIFFORD-TINKER MATTHEW
100 W 67TH ST #4W
NEW YORK, NY 10023

7-4-53-1-002-R

OLSON LESLIE L
39 GROVE ST
QUINCY, MA 02169

7-4-53-1-003-R

RUBIN SUELLEN
1760 EAST 21ST ST
BROOKLYN, NY 11229

7-4-53-1-004-R

THOMAS J SHEEHAN III REV TR
THOMAS JOSEPH SHEEHAN III
735 HARRISON AVE APT W-101
BOSTON, MA 02118-4902

7-4-53-1-005-R

BRIAN T SARR TR
83 SOUTH ST
BEDFORD, MA 01730

7-4-53-2-07A-R

MELENDEZ RONALD D ET AL
LAILTON DE SA GARCIA
61 FELLSWAY EAST
MELROSE, MA 02176

7-4-53-2-07B-R

DEAN JR STEVEN S ET AL
JARED W SCHWOCHO
599 LINWOOD AVE NE
ATLANTA, GA 30306

7-4-53-3-006-R

WARNER DAVID J ET AL
SAMEER T BHOITE
287 K STREET
BOSTON, MA 02127

7-4-53-Z-P0A-R

TREVOR'S TRAIL II LLC
C/O THE CHATHAM MANOR LLC
720 MAIN ST
CHATHAM, MA 02633

7-4-53-Z-P0B-R

TREVOR'S TRAIL II LLC
PO BOX 412
PROVINCETOWN, MA 02657

7-4-53-Z-P0C-R

OLSON LESLIE L
39 GROVE ST
QUINCY, MA 02169

7-4-53-Z-P0D-R

PUCK'S FOLLY LLC
2 REPUBLIC RD
N BILLERICA, MA 01864

7-4-53-Z-P0E-R

BAKER GREGORY ET AL
THOMAS WARD
1225 RESACA PL
PITTSBURGH, PA 15212

7-4-53-Z-P0F-R

JP SULLIVAN SOLO 401K TR
JOHN PATRICK SULLIVAN TTEE
62 BELLINGHAM ST
MENDON, MA 01756-1180

7-4-55-1-06A-R

TERJESEN ROBERT J ET AL
JAMES T RIEMAN
51 SOUTHVIEW CR
LAKE GROVE, NY 11755

7-4-55-1-06B-R

STEPHEN DONNELLY REV TR
STEPHEN M DONNELLY
505 W 47TH ST APT 1GS
NEW YORK, NY 10036-2450

7-4-55-2-04A-R

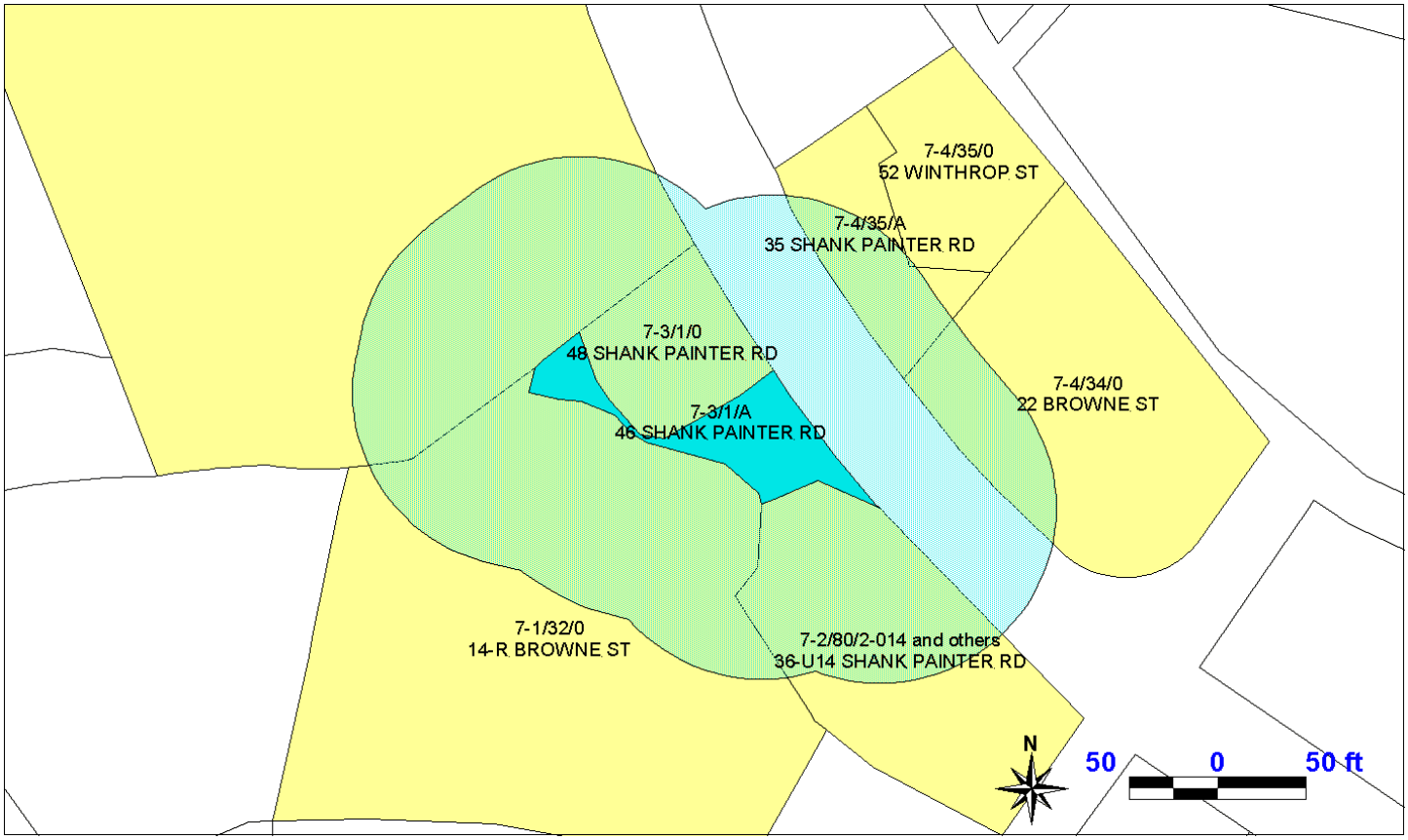
NANDINI TALWAR LIVING TR (1/2)
MADELINE ALBERT LIVING TR (1/2
31 STEVENS RD
MELROSE, MA 02176

7-4-55-2-04B-R

KJM 2022 TRUST
KEITH J MACDONALD TTEE
141 BEACONSFIELD RD #6
BROOKLINE, MA 02445

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 7-3/1/A



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
998	7-1-32-0-E	TOWN OF PROVINCETOWN	14-R BROWNE ST	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1242	7-2-80-1-010-R	R & C REALTY TR RONALD & CAROL PAVAO TTEES	36-U10 SHANK PAINTER RD	5 CENTRAL ST	PROVINCETOWN	MA	02657
1243	7-2-80-1-011-R	GETMAN HOWARD	36-U11 SHANK PAINTER RD	KORTE PRINSENGRACHT 15DE	AMSTERDAM,NETHERLAND		1013GN NETHERLAND
1244	7-2-80-1-012-R	D'ALESSO PETER	36-U12 SHANK PAINTER RD	99 COOKMAN AVE	OCEAN GROVE	NJ	07756
1245	7-2-80-2-014-R	COMCAST ATTN PROPERTY TAX DEPT	36-U14 SHANK PAINTER RD	ONE COMCAST CENTER 32ND FLOOR	PHILADELPHIA	PA	19103
1246	7-2-80-2-015-R	COMCAST ATTN PROPERTY TAX DEPT	36-U15 SHANK PAINTER RD	ONE COMCAST CENTER 32ND FLOOR	PHILADELPHIA	PA	19103
1247	7-2-80-3-016-R	COMCAST ATTN PROPERTY TAX DEPT	36-U16 SHANK PAINTER RD	ONE COMCAST CENTER 32ND FLOOR	PHILADELPHIA	PA	19103
1248	7-2-80-4-017-R	THE DAVID DOLBASHIAN TR DAVID AND JENNIFER DOLBASHIAN	36-U17 SHANK PAINTER RD	36-U17 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1249	7-2-80-5-018-R	KNUDSEN JEFFREY ET AL MICHAEL SCHWARTZ	36-U18 SHANK PAINTER RD	18 PARK VALE AVE #1	ALLSTON	MA	02134-2622
1250	7-2-80-6-019-R	HALE DAVID	36-U19 SHANK PAINTER RD	36-U19 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1251	7-2-80-7-020-R	MITTELL-WEINREB FAMILY TR P MITTELL & M WEINREB TTEES	36-U20 SHANK PAINTER RD	25 ALBION ST	SOMERVILLE	MA	02143
1423	7-3-1-0-R	48 SHANKPAINTER LLC ET AL H PRESTON LLC	48 SHANK PAINTER RD	22 ROUNDWOOD RD	NEWTON	MA	02464
9899	7-3-1-A-R	DELEHANTY ROBERT A	46 SHANK PAINTER RD	PO BOX 481	PROVINCETOWN	MA	02657
1424	7-3-2-0-R	SEAGULL REALTY TR CHARLES & HELEN SILVA TTEES	56 SHANK PAINTER RD	39 SHIPS WAY RD	PROVINCETOWN	MA	02657
1506	7-4-34-0-R	COWING BRIAN R ET UX RUTHANNE COWING	22 BROWNE ST	35 SHANK PAINTER RD	PROVINCETOWN	MA	02657

Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1507	7-4-35-0-R	DUTRA RUTH W	52 WINTHROP ST	PO BOX 4	PROVINCETOWN	MA	02657
1508	7-4-35-A-R	COWING BRIAN R ET UX RUTH ANNE COWING	35 SHANK PAINTER RD	35 SHANK PAINTER RD	PROVINCETOWN	MA	02657

7-1-32-0-E

TOWN OF PROVINCETOWN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-2-80-1-010-R

R & C REALTY TR
RONALD & CAROL PAVAO TTEES
5 CENTRAL ST
PROVINCETOWN, MA 02657

7-2-80-1-011-R

GETMAN HOWARD
KORTE PRINSENGRACHT 15DE
AMSTERDAM,NETHERLAND, 1013GN NETHERL

7-2-80-1-012-R

D'ALESSO PETER
99 COOKMAN AVE
OCEAN GROVE, NJ 07756

7-2-80-2-014-R

COMCAST
ATTN PROPERTY TAX DEPT
ONE COMCAST CENTER
32ND FLOOR
PHILADELPHIA, PA 19103

7-2-80-2-015-R

COMCAST
ATTN PROPERTY TAX DEPT
ONE COMCAST CENTER
32ND FLOOR
PHILADELPHIA, PA 19103

7-2-80-3-016-R

COMCAST
ATTN PROPERTY TAX DEPT
ONE COMCAST CENTER
32ND FLOOR
PHILADELPHIA, PA 19103

7-2-80-4-017-R

THE DAVID DOLBASHIAN TR
DAVID AND JENNIFER DOLBASHIAN
36-U17 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-80-5-018-R

KNUDSEN JEFFREY ET AL
MICHAEL SCHWARTZ
18 PARK VALE AVE #1
ALLSTON, MA 02134-2622

7-2-80-6-019-R

HALE DAVID
36-U19 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-80-7-020-R

MITTELL-WEINREB FAMILY TR
P MITTELL & M WEINREB TTEES
25 ALBION ST
SOMERVILLE, MA 02143

7-3-1-0-R

48 SHANKPAINTER LLC ET AL
H PRESTON LLC
22 ROUNDWOOD RD
NEWTON, MA 02464

7-3-1-A-R

DELEHANTY ROBERT A
PO BOX 481
PROVINCETOWN, MA 02657

7-3-2-0-R

SEAGULL REALTY TR
CHARLES & HELEN SILVA TTEES
39 SHIPS WAY RD
PROVINCETOWN, MA 02657

7-4-34-0-R

COWING BRIAN R ET UX
RUTHANNE COWING
35 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-4-35-0-R

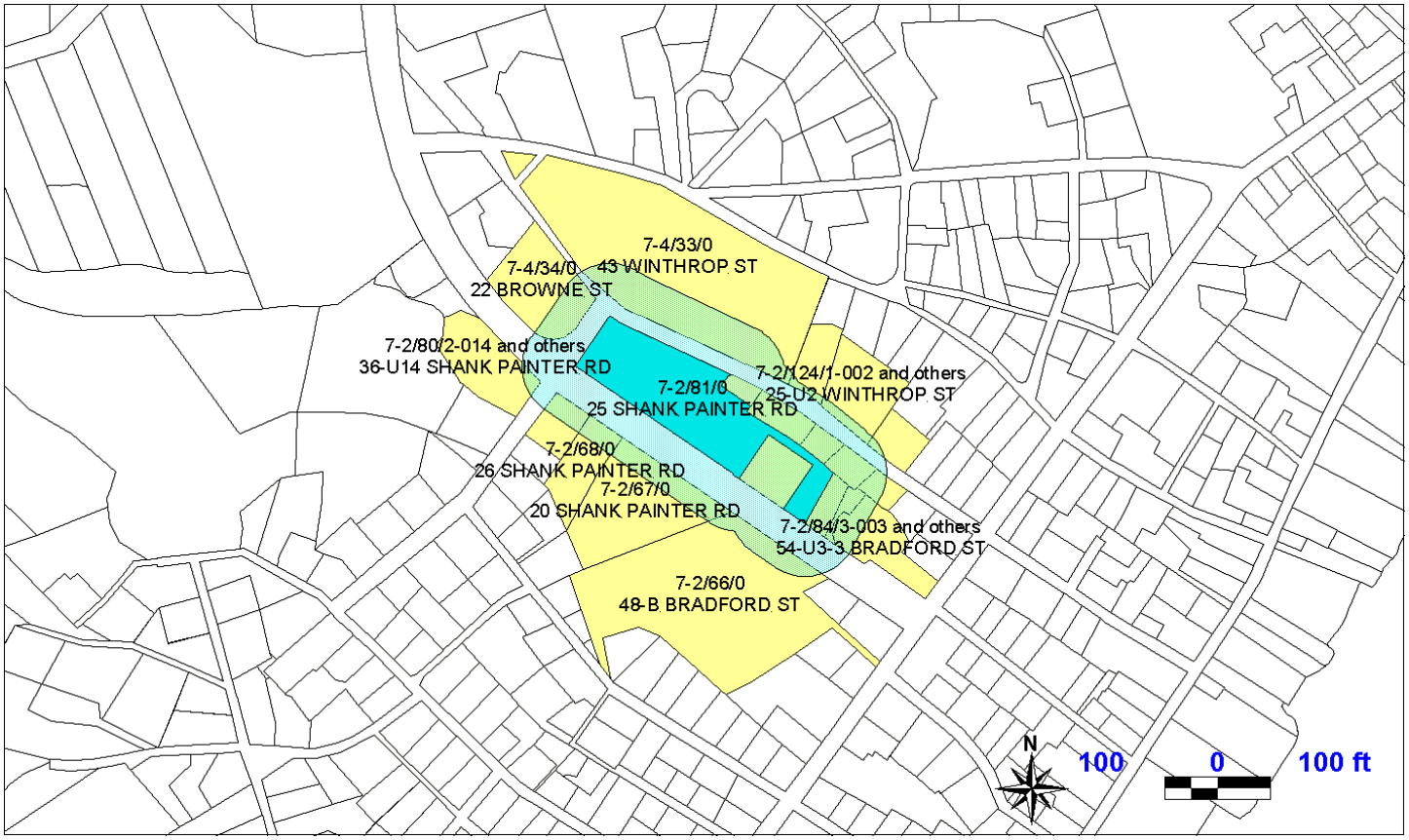
DUTRA RUTH W
PO BOX 4
PROVINCETOWN, MA 02657

7-4-35-A-R

COWING BRIAN R ET UX
RUTH ANNE COWING
35 SHANK PAINTER RD
PROVINCETOWN, MA 02657

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 7-2/81/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1226	7-2-66-0-R	JUDGE ELIZABETH CRAGG ET UX JAMES PATRICK JUDGE	48-B BRADFORD ST	3 OFF PRESCOTT ST	GROTON	MA	01450
1227	7-2-67-0-E	PROVINCETOWN UNITED METHODIST CHURCH	20 SHANK PAINTER RD	PO BOX 311	PROVINCETOWN	MA	02657
1228	7-2-68-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	26 SHANK PAINTER RD	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
12167	7-2-69--101-R	FURNACE BROOK REALTY TR JEFFREY & MAUREEN ARONSON TTEE	30-U101 SHANK PAINTER RD	1385 R WASHINGTON ST	WEYMOUTH	MA	02189
12169	7-2-69--102-R	DANSKIN KAREN P	30-U102 SHANK PAINTER RD	30-U102 SHANK PAINTER RD	PROVINCETOWN	MA	02657
12170	7-2-69--201-R	SCHECTER MITCHELL BART ET AL RANDALL BRENT STIMSON	30-U201 SHANK PAINTER RD	405 NORTHWEST 23RD AVE	FORT LAUDERDALE	FL	33311
12172	7-2-69--202-R	VEALENCIS JOSEPH J ET AL TIMOTHY RYAN FINK	30-U202 SHANK PAINTER RD	1120 E ST SE	WASHINGTON	DC	20003
12173	7-2-69--203-R	SOPHY KAO TRUST III SOPHY KAO TTEE	30-U203 SHANK PAINTER RD	123 UNION ST	MARLBORO	MA	01752
12175	7-2-69--301-R	FORCIER JOHN V	30-U301 SHANK PAINTER RD	87 SAWYER AVE UNIT 1	BOSTON	MA	02125
12177	7-2-69--302-R	SLK JAA 302 LLC	30-U302 SHANK PAINTER RD	62-3614 LOLII WAY E-4	KAMUELA	HI	96743
12179	7-2-69--303-R	COOPER MARTY AARON	30-U303 SHANK PAINTER RD	60 BROADWAY APT 2D	BROOKLYN	NY	11249
1242	7-2-80-1-010-R	R & C REALTY TR RONALD & CAROL PAVAO TTEES	36-U10 SHANK PAINTER RD	5 CENTRAL ST	PROVINCETOWN	MA	02657
1243	7-2-80-1-011-R	GETMAN HOWARD	36-U11 SHANK PAINTER RD	KORTE PRINSENGRACHT 15DE	AMSTERDAM,NETHERLAND		1013GN NETHERLAND
1244	7-2-80-1-012-R	D'ALESSO PETER	36-U12 SHANK PAINTER RD	99 COOKMAN AVE	OCEAN GROVE	NJ	07756
1245	7-2-80-2-014-R	COMCAST ATTN PROPERTY TAX DEPT	36-U14 SHANK PAINTER RD	ONE COMCAST CENTER 32ND FLOOR	PHILADELPHIA	PA	19103

Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1246	7-2-80-2-015-R	COMCAST ATTN PROPERTY TAX DEPT	36-U15 SHANK PAINTER RD	ONE COMCAST CENTER 32ND FLOOR	PHILADELPHIA	PA	19103
1247	7-2-80-3-016-R	COMCAST ATTN PROPERTY TAX DEPT	36-U16 SHANK PAINTER RD	ONE COMCAST CENTER 32ND FLOOR	PHILADELPHIA	PA	19103
1248	7-2-80-4-017-R	THE DAVID DOLBASHIAN TR DAVID AND JENNIFER DOLBASHIAN	36-U17 SHANK PAINTER RD	36-U17 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1249	7-2-80-5-018-R	KNUDSEN JEFFREY ET AL MICHAEL SCHWARTZ	36-U18 SHANK PAINTER RD	18 PARK VALE AVE #1	ALLSTON	MA	02134-2622
1250	7-2-80-6-019-R	HALE DAVID	36-U19 SHANK PAINTER RD	36-U19 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1251	7-2-80-7-020-R	MITTELL-WEINREB FAMILY TR P MITTELL & M WEINREB TTEES	36-U20 SHANK PAINTER RD	25 ALBION ST	SOMERVILLE	MA	02143
1252	7-2-81-0-E	TOWN OF PROVINCETOWN BOARD OF FIRE ENGINEERS	25 SHANK PAINTER RD	25 SHANK PAINTER RD	PROVINCETOWN	MA	02657
10718	7-2-81-Z-P01-R	SCHOFIELD PAUL ET AL ANDREW JORGENSEN	26-P01 WINTHROP ST	4 MAPLE COURT	PROVINCETOWN	MA	02657
10719	7-2-81-Z-P02-R	SCHOFIELD PAUL ET AL ANDREW JORGENSEN	26-P02 WINTHROP ST	4 MAPLE COURT	PROVINCETOWN	MA	02657
10720	7-2-81-Z-P03-R	SCHOFIELD PAUL ET AL ANDREW JORGENSEN	26-P03 WINTHROP ST	4 MAPLE COURT	PROVINCETOWN	MA	02657
10721	7-2-81-Z-P04-R	SCHOFIELD PAUL ET AL ANDREW JORGENSEN	26-P04 WINTHROP ST	4 MAPLE COURT	PROVINCETOWN	MA	02657
10722	7-2-81-Z-P05-R	SCHOFIELD PAUL ET AL ANDREW JORGENSEN	26-P05 WINTHROP ST	4 MAPLE COURT	PROVINCETOWN	MA	02657
10723	7-2-81-Z-P06-R	SCHOFIELD PAUL ET AL ANDREW JORGENSEN	26-P06 WINTHROP ST	4 MAPLE COURT	PROVINCETOWN	MA	02657
10724	7-2-81-Z-P07-R	26 WINTHROP ST REALTY TR DAVID M DATZ TTEE	26-P07 WINTHROP ST	530 TREMONT ST	BOSTON	MA	02116
10725	7-2-81-Z-P08-R	26 WINTHROP ST REALTY TR DAVID M DATZ TTEE	26-P08 WINTHROP ST	530 TREMONT ST	BOSTON	MA	02116
10726	7-2-81-Z-P09-R	26 WINTHROP ST REALTY TR DAVID M DATZ TTEE	26-P09 WINTHROP ST	530 TREMONT ST	BOSTON	MA	02116
10727	7-2-81-Z-P10-R	26 WINTHROP ST REALTY TR DAVID M DATZ TTEE	26-P10 WINTHROP ST	530 TREMONT ST	BOSTON	MA	02116
10728	7-2-81-Z-P11-R	26 WINTHROP ST REALTY TR DAVID M DATZ TTEE	26-P11 WINTHROP ST	530 TREMONT ST	BOSTON	MA	02116
10729	7-2-81-Z-P12-R	26 WINTHROP ST REALTY TR DAVID M DATZ TTEE	26-P12 WINTHROP ST	530 TREMONT ST	BOSTON	MA	02116
10730	7-2-81-Z-P13-R	26 WINTHROP ST REALTY TR DAVID M DATZ TTEE	26-P13 WINTHROP ST	530 TREMONT ST	BOSTON	MA	02116
1254	7-2-82-0-R	BLUE SUNSHINE REALTY LLC	13 SHANK PAINTER RD	9 SHANK PAINTER RD	PROVINCETOWN	MA	02657
11818	7-2-83--001-R	CHRISTOPHER E ENOS	9-U1 SHANK PAINTER RD	9-U1 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1256	7-2-84-1-001-R	SWAIN JONATHAN L ET VIR ANGEL L HUECA	54-U1-1 BRADFORD ST	17 TREMONT ST UNIT 2	CAMBRIDGE	MA	02139
1257	7-2-84-1-002-R	HALEY MARK A	54-U1-2 BRADFORD ST	14 DEWOLF ST	DORCHESTER	MA	02125
1258	7-2-84-1-003-R	KENDALL EARL	54-U1-3 BRADFORD ST	54 BRADFORD ST #1-4	PROVINCETOWN	MA	02657
1259	7-2-84-1-004-R	KENDALL EARL	54-U1-4 BRADFORD ST	54-U1-4 BRADFORD ST	PROVINCETOWN	MA	02657
1260	7-2-84-2-001-R	FESSLER KEVIN E	54-U2-1 BRADFORD ST	54-U2-1 BRADFORD ST	PROVINCETOWN	MA	02657
1261	7-2-84-2-002-R	HUSTON CORY WAYNE	54-U2-2 BRADFORD ST	54 BRADFORD ST #2-2	PROVINCETOWN	MA	02657
1262	7-2-84-2-003-R	PATRINOS VASILIOS	54-U2-3 BRADFORD ST	8 RICHARD ST	MEDFORD	MA	02155
1263	7-2-84-2-004-R	ARAGLEN LLC	54-U2-4 BRADFORD ST	22 GREEN LN	SPRINGFIELD	MA	01107
1264	7-2-84-2-005-R	GONCALVES J PAUL	54-U2-5 BRADFORD ST	54-U2-5 BRADFORD ST	PROVINCETOWN	MA	02657
1265	7-2-84-2-006-R	ROMANELLI JOSEPH RICHARD	54-U2-6 BRADFORD ST	1631 R ST. NW APT C	WASHINGTON	DC	20009
1266	7-2-84-3-001-R	CABRAL BRIAN J	54-U3-1 BRADFORD ST	PO BOX 1154	PROVINCETOWN	MA	02657
1267	7-2-84-3-002-R	SMITH JAMES A	54-U3-2 BRADFORD ST	68 E BERKLEY ST APT 6	BOSTON	MA	02118
1268	7-2-84-3-003-R	SALEMI JAMES MATTHEW ET VIR KENNETH JAMES BARTSCHI	54-U3-3 BRADFORD ST	209 BEACON ST	HARTFORD	CT	06106
1269	7-2-84-3-004-R	GLOVER GEORGE L III	54-U3-4 BRADFORD ST	15 JACLYN DR	COVENTRY	RI	02816-6094
1270	7-2-84-4-00A-R	ESCOLA DANIEL ALAN	54-UA BRADFORD ST	54-UA BRADFORD ST	PROVINCETOWN	MA	02657
1271	7-2-84-5-00B-R	CHRISTOPHER RONALD J JR ET AL RONALD SR & PAULA CHRISTOPHER	54-UB BRADFORD ST	6 ASHLAND ST UNIT 6	DORCHESTER	MA	02122
1272	7-2-84-6-00C-R	NIEHOFF KARISSA L C/O VILLEDA RAYMOND ET AL	54-UC BRADFORD ST	54-UC BRADFORD ST	PROVINCETOWN	MA	02657
11817	7-2-84-A-002-R	STEPHEN F ENOS	7-U2 SHANK PAINTER RD	7-U2 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1319	7-2-120-0-R	STEELE KATHERINE R ESTATE OF	22 WINTHROP ST	22 WINTHROP ST	PROVINCETOWN	MA	02657

Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1320	7-2-121-0-R	DODSON-ADAMS 2021 JOINT TR DW DODSON & JA ADAMS TTEES	24 WINTHROP ST	24 WINTHROP ST	PROVINCETOWN	MA	02657
1321	7-2-122--00A-R	ADVANI GEETANJALI ANU	28-UA WINTHROP ST	55 PARK ST UNIT 2B	BROOKLINE	MA	02446
1322	7-2-122--00B-R	LAMIR CAMERON MCCLLOUGH ET AL ALEX CHARLES KLEIN	28-UB WINTHROP ST	1001 W. ALTGELD #6	CHICAGO	IL	60614
1323	7-2-122--00C-R	BARBOUR DANIEL MANSOUR	28-UC WINTHROP ST	78 FLORAL ST	TAUNTON	MA	02780
1324	7-2-122--00D-R	ADVANI GEETANJALI ANU	28-UD WINTHROP ST	28-UD WINTHROP ST	PROVINCETOWN	MA	02657
1325	7-2-123-0-R	30 WINTHROP STREET LLC	30 WINTHROP ST	PO BOX 993	PROVINCETOWN	MA	02657
12402	7-2-123-A-R	MYERS THOMAS G ET AL JOSEPH M CASTO	27 WINTHROP ST	27 WINTHROP ST	PROVINCETOWN	MA	02657
1327	7-2-124-1-001-R	HINES ELLEN M	25-U1 WINTHROP ST	25-U1 WINTHROP ST	PROVINCETOWN	MA	02657
1328	7-2-124-1-002-R	RAMONA G BASTIDE LIVING TR RAMONA G BASTIDE TTEE	25-U2 WINTHROP ST	73 DONNELLAN CIRCLE	N WEYMOUTH	MA	02191-1761
1329	7-2-124-1-003-R	CAREY DAVID L ET AL KEVIN G HANNON	25-U3 WINTHROP ST	64 RYDER RD	SOUTH WEYMOUTH	MA	02190-1827
1330	7-2-124-1-004-R	GERALDINE M SPINELLA TR GERALDINE M SPINELLA TTEE	25-U4 WINTHROP ST	PO BOX 40	N TRURO	MA	02652
1331	7-2-124-2-005-R	BRADLEY JOHN MALLOW LIVING TR P DANIEL SKAHEN LIVING TR	25-U5 WINTHROP ST	25-U5 WINTHROP ST	PROVINCETOWN	MA	02657
10660	7-2-125-1-03C-R	MURRAY DONALD V ET AL WAYNE B SPIWAK	23-UC-3 WINTHROP ST	2907 WEST HARBORVIEW AVE	TAMPA	FL	33611
10662	7-2-125-1-04D-R	CASWELL KAREN A	23-UD-4 WINTHROP ST	23-UD-4 WINTHROP ST	PROVINCETOWN	MA	02657
10656	7-2-125-1-0A1-R	GEORGOUSIS VIVIAN ET AL MELISSA GIBERSON	23-UA-1 WINTHROP ST	16 LYLE AVE	WAYNE	NJ	07470-2720
10658	7-2-125-1-0B2-R	THE WALLS FAMILY TR AMY B WALLS TTEE	23-UB-2 WINTHROP ST	170 LAKE SHORE DR	WESTWOOD	MA	02090-2835
10664	7-2-125-2-05E-R	DAVIES RUSSELL C	23-UE-5 WINTHROP ST	78 MOUNTAIN ST	ELLINGTON	CT	06029
1505	7-4-33-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	43 WINTHROP ST	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1506	7-4-34-0-R	COWING BRIAN R ET UX RUTHANNE COWING	22 BROWNE ST	35 SHANK PAINTER RD	PROVINCETOWN	MA	02657

7-2-66-0-R

JUDGE ELIZABETH CRAGG ET UX
JAMES PATRICK JUDGE
3 OFF PRESCOTT ST
GROTON, MA 01450

7-2-67-0-E

PROVINCETOWN UNITED METHODIST
CHURCH
PO BOX 311
PROVINCETOWN, MA 02657

7-2-68-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-2-69--101-R

FURNACE BROOK REALTY TR
JEFFREY & MAUREEN ARONSON TTEE
1385 R WASHINGTON ST
WEYMOUTH, MA 02189

7-2-69--102-R

DANSKIN KAREN P
30-U102 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-69--201-R

SCHECTER MITCHELL BART ET AL
RANDALL BRENT STIMSON
405 NORTHWEST 23RD AVE
FORT LAUDERDALE, FL 33311

7-2-69--202-R

VEALENCIS JOSEPH J ET AL
TIMOTHY RYAN FINK
1120 E ST SE
WASHINGTON, DC 20003

7-2-69--203-R

SOPHY KAO TRUST III
SOPHY KAO TTEE
123 UNION ST
MARLBORO, MA 01752

7-2-69--301-R

FORCIER JOHN V
87 SAWYER AVE UNIT 1
BOSTON, MA 02125

7-2-69--302-R

SLK JAA 302 LLC
62-3614 LOLII WAY E-4
KAMUELA, HI 96743

7-2-69--303-R

COOPER MARTY AARON
60 BROADWAY APT 2D
BROOKLYN, NY 11249

7-2-80-1-010-R

R & C REALTY TR
RONALD & CAROL PAVAO TTEES
5 CENTRAL ST
PROVINCETOWN, MA 02657

7-2-80-1-011-R

GETMAN HOWARD
KORTE PRINSENGRACHT 15DE
AMSTERDAM,NETHERLAND, 1013GN NETHERL

7-2-80-1-012-R

D'ALESSO PETER
99 COOKMAN AVE
OCEAN GROVE, NJ 07756

7-2-80-2-014-R

COMCAST
ATTN PROPERTY TAX DEPT
ONE COMCAST CENTER
32ND FLOOR
PHILADELPHIA, PA 19103

7-2-80-2-015-R

COMCAST
ATTN PROPERTY TAX DEPT
ONE COMCAST CENTER
32ND FLOOR
PHILADELPHIA, PA 19103

7-2-80-3-016-R

COMCAST
ATTN PROPERTY TAX DEPT
ONE COMCAST CENTER
32ND FLOOR
PHILADELPHIA, PA 19103

7-2-80-4-017-R

THE DAVID DOLBASHIAN TR
DAVID AND JENNIFER DOLBASHIAN
36-U17 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-80-5-018-R

KNUDSEN JEFFREY ET AL
MICHAEL SCHWARTZ
18 PARK VALE AVE #1
ALLSTON, MA 02134-2622

7-2-80-6-019-R

HALE DAVID
36-U19 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-80-7-020-R

MITTELL-WEINREB FAMILY TR
P MITTELL & M WEINREB TTEES
25 ALBION ST
SOMERVILLE, MA 02143

7-2-81-0-E

TOWN OF PROVINCETOWN
BOARD OF FIRE ENGINEERS
25 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-81-Z-P01-R

SCHOFIELD PAUL ET AL
ANDREW JORGENSEN
4 MAPLE COURT
PROVINCETOWN, MA 02657

7-2-81-Z-P02-R

SCHOFIELD PAUL ET AL
ANDREW JORGENSEN
4 MAPLE COURT
PROVINCETOWN, MA 02657

7-2-81-Z-P03-R

SCHOFIELD PAUL ET AL
ANDREW JORGENSEN
4 MAPLE COURT
PROVINCETOWN, MA 02657

7-2-81-Z-P04-R

SCHOFIELD PAUL ET AL
ANDREW JORGENSEN
4 MAPLE COURT
PROVINCETOWN, MA 02657

7-2-81-Z-P05-R

SCHOFIELD PAUL ET AL
ANDREW JORGENSEN
4 MAPLE COURT
PROVINCETOWN, MA 02657

7-2-81-Z-P06-R

SCHOFIELD PAUL ET AL
ANDREW JORGENSEN
4 MAPLE COURT
PROVINCETOWN, MA 02657

7-2-81-Z-P07-R

26 WINTHROP ST REALTY TR
DAVID M DATZ TTEE
530 TREMONT ST
BOSTON, MA 02116

7-2-81-Z-P08-R

26 WINTHROP ST REALTY TR
DAVID M DATZ TTEE
530 TREMONT ST
BOSTON, MA 02116

7-2-81-Z-P09-R

26 WINTHROP ST REALTY TR
DAVID M DATZ TTEE
530 TREMONT ST
BOSTON, MA 02116

7-2-81-Z-P10-R

26 WINTHROP ST REALTY TR
DAVID M DATZ TTEE
530 TREMONT ST
BOSTON, MA 02116

7-2-81-Z-P11-R

26 WINTHROP ST REALTY TR
DAVID M DATZ TTEE
530 TREMONT ST
BOSTON, MA 02116

7-2-81-Z-P12-R

26 WINTHROP ST REALTY TR
DAVID M DATZ TTEE
530 TREMONT ST
BOSTON, MA 02116

7-2-81-Z-P13-R

26 WINTHROP ST REALTY TR
DAVID M DATZ TTEE
530 TREMONT ST
BOSTON, MA 02116

7-2-82-0-R

BLUE SUNSHINE REALTY LLC
9 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-83--001-R

CHRISTOPHER E ENOS
9-U1 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-84-1-001-R

SWAIN JONATHAN L ET VIR
ANGEL L HUECA
17 TREMONT ST UNIT 2
CAMBRIDGE, MA 02139

7-2-84-1-002-R

HALEY MARK A
14 DEWOLF ST
DORCHESTER, MA 02125

7-2-84-1-003-R

KENDALL EARL
54 BRADFORD ST #1-4
PROVINCETOWN, MA 02657

7-2-84-1-004-R

KENDALL EARL
54-U1-4 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-2-001-R

FESSLER KEVIN E
54-U2-1 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-2-002-R

HUSTON CORY WAYNE
54 BRADFORD ST #2-2
PROVINCETOWN, MA 02657

7-2-84-2-003-R

PATRINOS VASILIOS
8 RICHARD ST
MEDFORD, MA 02155

7-2-84-2-004-R

ARAGLEN LLC
22 GREEN LN
SPRINGFIELD, MA 01107

7-2-84-2-005-R

GONCALVES J PAUL
54-U2-5 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-2-006-R

ROMANELLI JOSEPH RICHARD
1631 R ST. NW APT C
WASHINGTON, DC 20009

7-2-84-3-001-R

CABRAL BRIAN J
PO BOX 1154
PROVINCETOWN, MA 02657

7-2-84-3-002-R

SMITH JAMES A
68 E BERKLEY ST APT 6
BOSTON, MA 02118

7-2-84-3-003-R

SALEMI JAMES MATTHEW ET VIR
KENNETH JAMES BARTSCHI
209 BEACON ST
HARTFORD, CT 06106

7-2-84-3-004-R

GLOVER GEORGE L III
15 JACLYN DR
COVENTRY, RI 02816-6094

7-2-84-4-00A-R

ESCOLA DANIEL ALAN
54-UA BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-5-00B-R

CHRISTOPHER RONALD J JR ET AL
RONALD SR & PAULA CHRISTOPHER
6 ASHLAND ST UNIT 6
DORCHESTER, MA 02122

7-2-84-6-00C-R

NIEHOFF KARISSA L
C/O VILLEDA RAYMOND ET AL
54-UC BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-A-002-R

STEPHEN F ENOS
7-U2 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-120-0-R

STEELE KATHERINE R ESTATE OF
22 WINTHROP ST
PROVINCETOWN, MA 02657

7-2-121-0-R

DODSON-ADAMS 2021 JOINT TR
DW DODSON & JA ADAMS TTEES
24 WINTHROP ST
PROVINCETOWN, MA 02657

7-2-122--00A-R

ADVANI GEETANJALI ANU
55 PARK ST UNIT 2B
BROOKLINE, MA 02446

7-2-122--00B-R

LAMIR CAMERON MCCLLOUGH ET AL
ALEX CHARLES KLEIN
1001 W. ALTGELD #6
CHICAGO, IL 60614

7-2-122--00C-R

BARBOUR DANIEL MANSOUR
78 FLORAL ST
TAUNTON, MA 02780

7-2-122--00D-R

ADVANI GEETANJALI ANU
28-UD WINTHROP ST
PROVINCETOWN, MA 02657

7-2-123-0-R

30 WINTHROP STREET LLC
PO BOX 993
PROVINCETOWN, MA 02657

7-2-123-A-R

MYERS THOMAS G ET AL
JOSEPH M CASTO
27 WINTHROP ST
PROVINCETOWN, MA 02657

7-2-124-1-001-R

HINES ELLEN M
25-U1 WINTHROP ST
PROVINCETOWN, MA 02657

7-2-124-1-002-R

RAMONA G BASTIDE LIVING TR
RAMONA G BASTIDE TTEE
73 DONNELLAN CIRCLE
N WEYMOUTH, MA 02191-1761

7-2-124-1-003-R

CAREY DAVID L ET AL
KEVIN G HANNON
64 RYDER RD
SOUTH WEYMOUTH, MA 02190-1827

7-2-124-1-004-R

GERALDINE M SPINELLA TR
GERALDINE M SPINELLA TTEE
PO BOX 40
N TRURO, MA 02652

7-2-124-2-005-R

BRADLEY JOHN MALLOW LIVING TR
P DANIEL SKAHEN LIVING TR
25-U5 WINTHROP ST
PROVINCETOWN, MA 02657

7-2-125-1-03C-R

MURRAY DONALD V ET AL
WAYNE B SPIWAK
2907 WEST HARBORVIEW AVE
TAMPA, FL 33611

7-2-125-1-04D-R

CASWELL KAREN A
23-UD-4 WINTHROP ST
PROVINCETOWN, MA 02657

7-2-125-1-0A1-R

GEORGOUSIS VIVIAN ET AL
MELISSA GIBERSON
16 LYLE AVE
WAYNE, NJ 07470-2720

7-2-125-1-0B2-R

THE WALLS FAMILY TR
AMY B WALLS TTEE
170 LAKE SHORE DR
WESTWOOD, MA 02090-2835

7-2-125-2-05E-R

DAVIES RUSSELL C
78 MOUNTAIN ST
ELLINGTON, CT 06029

7-4-33-0-E

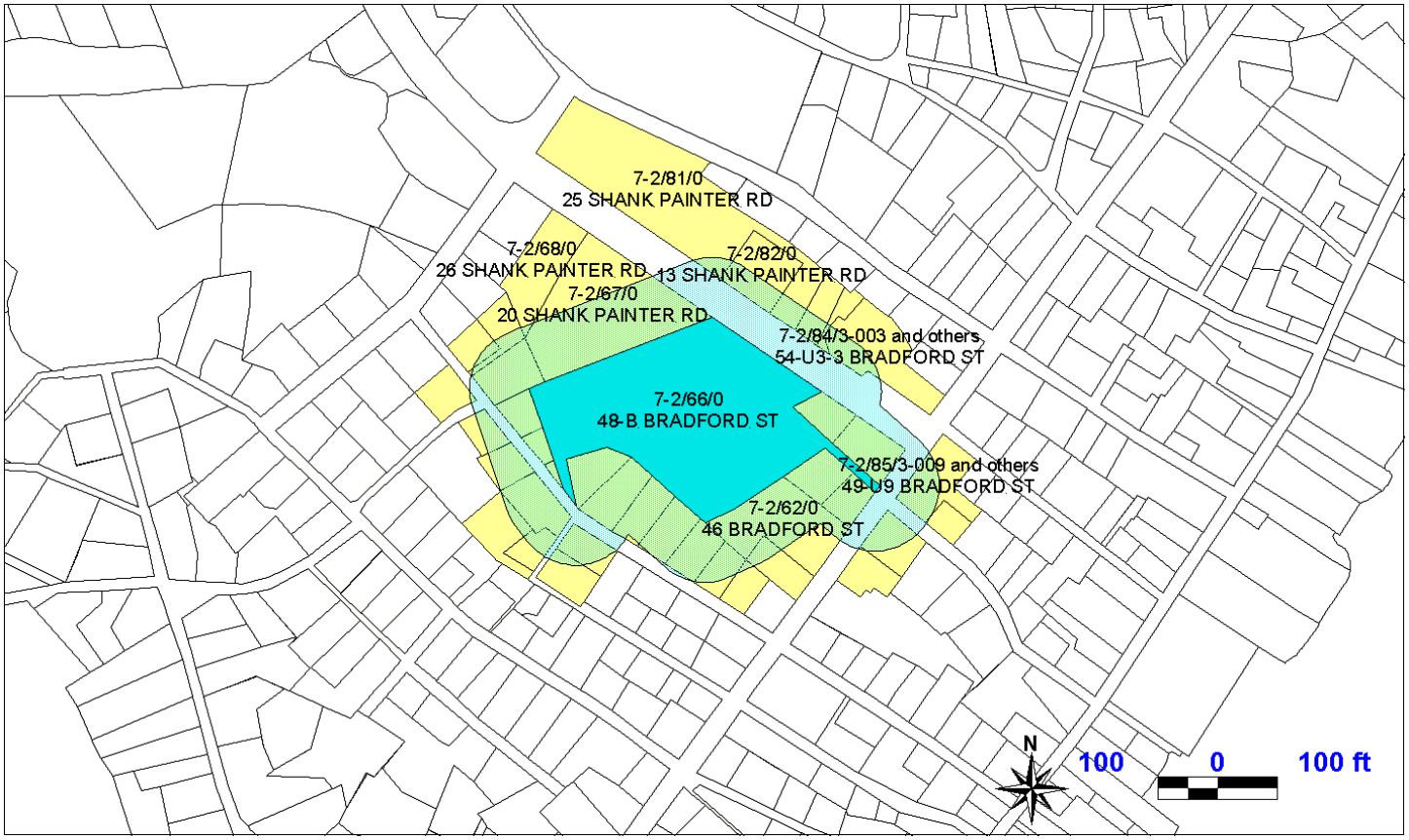
TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-4-34-0-R

COWING BRIAN R ET UX
RUTHANNE COWING
35 SHANK PAINTER RD
PROVINCETOWN, MA 02657

TOWN OF PROVINCETOWN, MA
BOARD OF ASSESSORS
260 Commercial Street

Abutters List Within 100 feet of Parcel 7-2/66/0



Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1140	7-2-10--001-R	GREGORY J PESIK 2011 TR GREGORY J PESIK TTEE	12-U1 ATLANTIC AVE	12-U1 ATLANTIC AVE	PROVINCETOWN	MA	02657
1141	7-2-10--002-R	FEIJO EDMUND ET AL BRIAN C LONG	12-U2 ATLANTIC AVE	770 BOYLSTON ST APT 25G	BOSTON	MA	02199-7722
1142	7-2-10--003-R	EDWARDS VINCENT H ET AL RODNEY V AYERS	12-U3 ATLANTIC AVE	300 WESTMINSTER ST	PROVIDENCE	RI	02903
1143	7-2-10--004-R	D'AGOSTINO ANTHONY	12-U4 ATLANTIC AVE	119 TAFT PT UNIT 8	WATERBURY	CT	06708-5909
1144	7-2-11-0-R	43 TOWN LLC	43 BRADFORD ST	79 -U1 COMMERCIAL ST	PROVINCETOWN	MA	02657
1186	7-2-37-0-R	ARROYO JORGE ET AL RAFAEL CAMPO	25 MONTELLO ST	50 EDGEHILL RD	BROOKLINE	MA	02445
10615	7-2-46-1-001-R	CHARETTE CHRISTIAN ET VIR RICHARD S FITZSIMMONS	30-U1 CONANT ST	30-U1 CONANT ST	PROVINCETOWN	MA	02657
10617	7-2-46-1-002-R	CHARETTE CHRISTIAN ET VIR RICHARD FITZSIMMONS	30-U2 CONANT ST	30-U1 CONANT ST	PROVINCETOWN	MA	02657
1200	7-2-47-0-R	ENOS LUCIA S	29 MONTELLO ST	32 CONANT ST	PROVINCETOWN	MA	02657
1201	7-2-48-0-R	COLDREN ROBERT L	27 MONTELLO ST	1712 OLMSTED WAY W	CAMP HILL	PA	17011
1202	7-2-49-0-R	ENOS LUCIA S	32 CONANT ST	32 CONANT ST	PROVINCETOWN	MA	02657
1203	7-2-51-0-R	KEYES MICHAEL ET VIR STEPHEN COLLINS	2 FRITZS WY	13 FOXHALL DR	SARATOGA SPRINGS	NY	12866
1204	7-2-53-0-R	ENOS LEONARD E JR ET UX C/O TREVOR'S TRAIL II, LLC	35 CONANT ST	PO BOX 412	PROVINCETOWN	MA	02657
1205	7-2-54-0-R	ENOS LEONARD E JR ET UX C/O TREVOR'S TRAIL II, LLC	33 CONANT ST	PO BOX 412	PROVINCETOWN	MA	02657
1206	7-2-55-0-R	ENOS FAMILY TR OF 6/25/14 GLEN A ENOS TTEE	31 CONANT ST	PO BOX 1142	TRURO	MA	02666

Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
11042	7-2-56-1-001-R	TYLER JASON J ET VIR MICHAEL F SANTOS	29-U1 CONANT ST	21 FORBES RD	HUDSON	MA	01749
11043	7-2-56-1-002-R	POLLOCK JONATHAN R ET VIR CHRISTOPHER L PIERCE	29-U2 CONANT ST	295 WEST 11TH ST UNIT 6D	NEW YORK	NY	10014
11044	7-2-56-1-003-R	BUTTS JOSHUA BROCK	29-U3 CONANT ST	29-U3 CONANT ST	PROVINCETOWN	MA	02657
8819	7-2-57--001-R	COOPER MICHAEL J	27-U1 CONANT ST	27-U1 CONANT ST	PROVINCETOWN	MA	02657
8820	7-2-57--002-R	KAREN D KAUFMAN LIVING TR KAREN D KAUFMAN TTEE	27-U2 CONANT ST	41 CREHORE RD	CHESTNUT HILL	MA	02467
1209	7-2-58-0-R	ORCHARD EAST LLC	25 CONANT ST	26 ORCHARD RD	BROOKLINE	MA	02445
1210	7-2-59-1-001-R	CURRAN JAMES J	23-U1 CONANT ST	12 SPRING GARDEN ST # B	BOSTON	MA	02125
1211	7-2-59-1-002-R	WALLACE TIMOTHY R	23-U2 CONANT ST	36 UPTON ST #1	BOSTON	MA	02118
1212	7-2-59-1-003-R	HALL MICHAEL J	23-U3 CONANT ST	22 WOODCREST LN	MILTON	NY	12547
1213	7-2-59-2-004-R	JAMES T DWYER REV LIV TR AGREE	23-U4 CONANT ST	23-U4 CONANT ST	PROVINCETOWN	MA	02657
1214	7-2-59-3-005-R	SHEIRETOV YANKO	23-U5 CONANT ST	472 LINCOLN ST	WALTHAM	MA	02451-0849
1217	7-2-61-0-R	MEADOWS REALTY TR JEFFRY PITTMAN TTEE	42 BRADFORD ST	42 BRADFORD ST	PROVINCETOWN	MA	02657
1218	7-2-62-0-R	TOWN OF PROVINCETOWN RECREATION COMMISSION	46 BRADFORD ST	C/O PROVINCETOWN COMMONS INC 46 BRADFORD ST	PROVINCETOWN	MA	02657
1219	7-2-63-0-R	ROY LEON R ET AL PAUL S CORNELIO	48 BRADFORD ST	48 1/2 BRADFORD ST	PROVINCETOWN	MA	02657
11281	7-2-64-1-001-R	KRISTINE SCHROEDER	48-AU1 BRADFORD ST	11 TANNERY BROOK ROW APT#3	SOMERVILLE	MA	02144-2774
11283	7-2-64-1-002-R	MCEVOY SANDRA M ET AL ANDREA L DOTTOLO	48-AU2 BRADFORD ST	336 WILLIAMS ST	PROVIDENCE	RI	02906
11285	7-2-64-1-003-R	DENVERFROST LLC	48-AU3 BRADFORD ST	1044 ADAMS ST	DORCHESTER	MA	02124
1221	7-2-65-0-R	50 BRADFORD ST REALTY TR GREGORY E LAMBROU TTEE	50 BRADFORD ST	PO BOX 570	N TRURO	MA	02652-0570
1223	7-2-65-A-001-R	FLANAGAN MICHAEL R	4-U1 SHANK PAINTER RD	4-U1 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1224	7-2-65-A-002-R	DEAN CODY RAY	4-U2 SHANK PAINTER RD	3746 N FREMONT ST APT 1	CHICAGO	IL	60613
1225	7-2-65-A-003-R	QUINN KEVIN T	4-U3 SHANK PAINTER RD	54 FRANKLIN ST APT 2	PROVINCETOWN	MA	02657-2054
9659	7-2-65-Z-P03-R	KELLEY GEORGE P ET AL MICHAEL C SIMPSON	4-P03 SHANK PAINTER RD	157 A COMMERCIAL ST UNIT 1	PROVINCETOWN	MA	02657
9660	7-2-65-Z-P07-R	HOUSE ANTHONY P	4-P07 SHANK PAINTER RD	6 CONANT ST	PROVINCETOWN	MA	02657
9661	7-2-65-Z-P08-R	SMITH JOSEPH	4-P08 SHANK PAINTER RD	87 SEAVER ST	BROOKLINE	MA	02445-5714
1226	7-2-66-0-R	JUDGE ELIZABETH CRAGG ET UX JAMES PATRICK JUDGE	48-B BRADFORD ST	3 OFF PRESCOTT ST	GROTON	MA	01450
1227	7-2-67-0-E	PROVINCETOWN UNITED METHODIST CHURCH	20 SHANK PAINTER RD	PO BOX 311	PROVINCETOWN	MA	02657
1228	7-2-68-0-E	TOWN OF PROVINCETOWN BOARD OF SELECTMEN	26 SHANK PAINTER RD	260 COMMERCIAL ST	PROVINCETOWN	MA	02657
1233	7-2-73-0-R	SHEEHAN JR JOHN J ET AL KEVIN MRAZIK	9 FRITZS WY	9 FRITZS WY	PROVINCETOWN	MA	02657
1234	7-2-74-0-R	SHEEHAN JR JOHN J ET AL KEVIN MRAZIK	7 FRITZS WY	9 FRITZS WY	PROVINCETOWN	MA	02657
8591	7-2-75--00A-R	RUIZ ANA	5-UA FRITZS WY	5-UA FRITZS WY	PROVINCETOWN	MA	02657
8592	7-2-75--00B-R	BARREPSKI ERIN	5-UB FRITZS WY	5-UB FRITZS WY	PROVINCETOWN	MA	02657
1236	7-2-76-0-R	GRIFFIN TYLER E B ET AL BRIAN JOSEPH GRIFFIN	7 KINGS WY	72 ORANGE ST UNIT 2A	PROVIDENCE	RI	02903
1238	7-2-76-A-101-R	MCDONALD KEVIN J	3-U1 FRITZS WY	315 EAST NELSON AVE	ALEXANDRIA	VA	22301
1239	7-2-76-A-202-R	RANKIN TIMOTHY SHANE ET VIR DAVID ALLAN PASS	3-U2 FRITZS WY	3701 NORBOURNE BLVD	LOUISVILLE	KY	40207
1241	7-2-79-0-R	TYSZKA ALEXANDRA ET AL DIANE HUDSON	6 KINGS WY	6 KINGS WAY	PROVINCETOWN	MA	02657
1252	7-2-81-0-E	TOWN OF PROVINCETOWN BOARD OF FIRE ENGINEERS	25 SHANK PAINTER RD	25 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1254	7-2-82-0-R	BLUE SUNSHINE REALTY LLC	13 SHANK PAINTER RD	9 SHANK PAINTER RD	PROVINCETOWN	MA	02657
11818	7-2-83--001-R	CHRISTOPHER E ENOS	9-U1 SHANK PAINTER RD	9-U1 SHANK PAINTER RD	PROVINCETOWN	MA	02657
1256	7-2-84-1-001-R	SWAIN JONATHAN L ET VIR ANGEL L HUECA	54-U1-1 BRADFORD ST	17 TREMONT ST UNIT 2	CAMBRIDGE	MA	02139
1257	7-2-84-1-002-R	HALEY MARK A	54-U1-2 BRADFORD ST	14 DEWOLF ST	DORCHESTER	MA	02125
1258	7-2-84-1-003-R	KENDALL EARL	54-U1-3 BRADFORD ST	54 BRADFORD ST #1-4	PROVINCETOWN	MA	02657

Key	Parcel ID	Owner	Location	Mailing Street	Mailing City	ST	ZipCd/Country
1259	7-2-84-1-004-R	KENDALL EARL	54-U1-4 BRADFORD ST	54-U1-4 BRADFORD ST	PROVINCETOWN	MA	02657
1260	7-2-84-2-001-R	FESSLER KEVIN E	54-U2-1 BRADFORD ST	54-U2-1 BRADFORD ST	PROVINCETOWN	MA	02657
1261	7-2-84-2-002-R	HUSTON CORY WAYNE	54-U2-2 BRADFORD ST	54 BRADFORD ST #2-2	PROVINCETOWN	MA	02657
1262	7-2-84-2-003-R	PATRINOS VASILIOS	54-U2-3 BRADFORD ST	8 RICHARD ST	MEDFORD	MA	02155
1263	7-2-84-2-004-R	ARAGLEN LLC	54-U2-4 BRADFORD ST	22 GREEN LN	SPRINGFIELD	MA	01107
1264	7-2-84-2-005-R	GONCALVES J PAUL	54-U2-5 BRADFORD ST	54-U2-5 BRADFORD ST	PROVINCETOWN	MA	02657
1265	7-2-84-2-006-R	ROMANELLI JOSEPH RICHARD	54-U2-6 BRADFORD ST	1631 R ST. NW APT C	WASHINGTON	DC	20009
1266	7-2-84-3-001-R	CABRAL BRIAN J	54-U3-1 BRADFORD ST	PO BOX 1154	PROVINCETOWN	MA	02657
1267	7-2-84-3-002-R	SMITH JAMES A	54-U3-2 BRADFORD ST	68 E BERKLEY ST APT 6	BOSTON	MA	02118
1268	7-2-84-3-003-R	SALEMI JAMES MATTHEW ET VIR KENNETH JAMES BARTSCHI	54-U3-3 BRADFORD ST	209 BEACON ST	HARTFORD	CT	06106
1269	7-2-84-3-004-R	GLOVER GEORGE L III	54-U3-4 BRADFORD ST	15 JACLYN DR	COVENTRY	RI	02816-6094
1270	7-2-84-4-00A-R	ESCOLA DANIEL ALAN	54-UA BRADFORD ST	54-UA BRADFORD ST	PROVINCETOWN	MA	02657
1271	7-2-84-5-00B-R	CHRISTOPHER RONALD J JR ET AL RONALD SR & PAULA CHRISTOPHER	54-UB BRADFORD ST	6 ASHLAND ST UNIT 6	DORCHESTER	MA	02122
1272	7-2-84-6-00C-R	NIEHOFF KARISSA L C/O VILLEDA RAYMOND ET AL	54-UC BRADFORD ST	54-UC BRADFORD ST	PROVINCETOWN	MA	02657
11817	7-2-84-A-002-R	STEPHEN F ENOS	7-U2 SHANK PAINTER RD	7-U2 SHANK PAINTER RD	PROVINCETOWN	MA	02657
8555	7-2-85-1-001-R	MOUNIC GERARD M	49-U1 BRADFORD ST	145 EAST 15TH ST APT 1L	NEW YORK	NY	10003
8556	7-2-85-1-002-R	ONEIL CARON ET AL SUSAN OMALLEY	49-U2 BRADFORD ST	11 COTTAGE LN	WEYMOUTH	MA	02188
8557	7-2-85-1-003-R	FESSLER KEVIN E	49-U3 BRADFORD ST	54 U2-1 BRADFORD ST	PROVINCETOWN	MA	02657
8559	7-2-85-1-004-R	WOLPER JEFFREY F	49-U4 BRADFORD ST	314 W 56TH ST UNIT 2A	NEW YORK	NY	10019
8560	7-2-85-1-005-R	GOMEZ-STARNES FLOYD ET VIR CARLOS A GOMEZ-STARNES	49-U5 BRADFORD ST	505 PERSHING DR	SILVER SPRING	MD	20910
8561	7-2-85-1-006-R	CLEMENTS JAMES JOSEPH	49-U6 BRADFORD ST	14 LINDEN ST	DORCHESTER	MA	02122
8563	7-2-85-2-007-R	JEAN M CATTO TRUST SCOTT A CATTO TTEE	49-U7 BRADFORD ST	24 SUMMER ST	YARMOUTHPORT	MA	02675
8564	7-2-85-2-008-R	BECKER ANDREW J ET AL SCOTT A PYNE	49-U8 BRADFORD ST	827 WASHINGTON ST #3-A	HOBOKEN	NJ	07030
8565	7-2-85-3-009-R	VENUTI PROPERTIES LLC	49-U9 BRADFORD ST	6 LA COLLINE DR	MILL NECK	NY	11765
8567	7-2-85-4-010-R	ANCHOR & WINGS, LLC	49-U10 BRADFORD ST	4850 MONTECITO AVE	SANTA ROSA	CA	95404
8569	7-2-85-5-011-R	JUDY MUPP LLC	49-U11 BRADFORD ST	832 DURANT PLACE NE	ATLANTA	GA	30308
8778	7-2-86--00A-R	KOBLER BRET G ET VIR MICHAEL J DOYLE JR	11-UA ATLANTIC AVE	1210 2ND AVE	ASBURY PARK	NJ	07712
8779	7-2-86--00B-R	11 ATLANTIC AVE REALTY TRUST J M MERRITT & A E KUMPEL TTEES	11-UB ATLANTIC AVE	25 MARLBORO RD	SOUTHBOROUGH	MA	01772
8780	7-2-86--00C-R	EDWARD R LEHMAN LIV TR EDWARD R LEHMAN TTEE	11-UC ATLANTIC AVE	1807 SOUTH HAYWORTH AVE	LOS ANGELES	CA	90035

7-2-10--001-R

GREGORY J PESIK 2011 TR
GREGORY J PESIK TTEE
12-U1 ATLANTIC AVE
PROVINCETOWN, MA 02657

7-2-10--002-R

FEIJO EDMUND ET AL
BRIAN C LONG
770 BOYLSTON ST APT 25G
BOSTON, MA 02199-7722

7-2-10--003-R

EDWARDS VINCENT H ET AL
RODNEY V AYERS
300 WESTMINSTER ST
PROVIDENCE, RI 02903

7-2-10--004-R

D'AGOSTINO ANTHONY
119 TAFT PT UNIT 8
WATERBURY, CT 06708-5909

7-2-11-0-R

43 TOWN LLC
79 -U1 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-2-37-0-R

ARROYO JORGE ET AL
RAFAEL CAMPO
50 EDGEHILL RD
BROOKLINE, MA 02445

7-2-46-1-001-R

CHARETTE CHRISTIAN ET VIR
RICHARD S FITZSIMMONS
30-U1 CONANT ST
PROVINCETOWN, MA 02657

7-2-46-1-002-R

CHARETTE CHRISTIAN ET VIR
RICHARD FITZSIMMONS
30-U1 CONANT ST
PROVINCETOWN, MA 02657

7-2-47-0-R

ENOS LUCIA S
32 CONANT ST
PROVINCETOWN, MA 02657

7-2-48-0-R

COLDREN ROBERT L
1712 OLMSTED WAY W
CAMP HILL, PA 17011

7-2-49-0-R

ENOS LUCIA S
32 CONANT ST
PROVINCETOWN, MA 02657

7-2-51-0-R

KEYES MICHAEL ET VIR
STEPHEN COLLINS
13 FOXHALL DR
SARATOGA SPRINGS, NY 12866

7-2-53-0-R

ENOS LEONARD E JR ET UX
C/O TREVOR'S TRAIL II, LLC
PO BOX 412
PROVINCETOWN, MA 02657

7-2-54-0-R

ENOS LEONARD E JR ET UX
C/O TREVOR'S TRAIL II, LLC
PO BOX 412
PROVINCETOWN, MA 02657

7-2-55-0-R

ENOS FAMILY TR OF 6/25/14
GLEN A ENOS TTEE
PO BOX 1142
TRURO, MA 02666

7-2-56-1-001-R

TYLER JASON J ET VIR
MICHAEL F SANTOS
21 FORBES RD
HUDSON, MA 01749

7-2-56-1-002-R

POLLOCK JONATHAN R ET VIR
CHRISTOPHER L PIERCE
295 WEST 11TH ST UNIT 6D
NEW YORK, NY 10014

7-2-56-1-003-R

BUTTS JOSHUA BROCK
29-U3 CONANT ST
PROVINCETOWN, MA 02657

7-2-57--001-R

COOPER MICHAEL J
27-U1 CONANT ST
PROVINCETOWN, MA 02657

7-2-57--002-R

KAREN D KAUFMAN LIVING TR
KAREN D KAUFMAN TTEE
41 CREHORE RD
CHESTNUT HILL, MA 02467

7-2-58-0-R

ORCHARD EAST LLC
26 ORCHARD RD
BROOKLINE, MA 02445

7-2-59-1-001-R

CURRAN JAMES J
12 SPRING GARDEN ST # B
BOSTON, MA 02125

7-2-59-1-002-R

WALLACE TIMOTHY R
36 UPTON ST #1
BOSTON, MA 02118

7-2-59-1-003-R

HALL MICHAEL J
22 WOODCREST LN
MILTON, NY 12547

7-2-59-2-004-R

JAMES T DWYER REV LIV TR AGREE
23-U4 CONANT ST
PROVINCETOWN, MA 02657

7-2-59-3-005-R

SHEIRETOV YANKO
472 LINCOLN ST
WALTHAM, MA 02451-0849

7-2-61-0-R

MEADOWS REALTY TR
JEFFRY PITTMAN TTEE
42 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-62-0-R

TOWN OF PROVINCETOWN
RECREATION COMMISSION
C/O PROVINCETOWN COMMONS INC
46 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-63-0-R

ROY LEON R ET AL
PAUL S CORNELIO
48 1/2 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-64-1-001-R

KRISTINE SCHROEDER
11 TANNERY BROOK ROW APT#3
SOMERVILLE, MA 02144-2774

7-2-64-1-002-R

MCEVOY SANDRA M ET AL
ANDREA L DOTTOLO
336 WILLIAMS ST
PROVIDENCE, RI 02906

7-2-64-1-003-R

DENVERFROST LLC
1044 ADAMS ST
DORCHESTER, MA 02124

7-2-65-0-R

50 BRADFORD ST REALTY TR
GREGORY E LAMBROU TTEE
PO BOX 570
N TRURO, MA 02652-0570

7-2-65-A-001-R

FLANAGAN MICHAEL R
4-U1 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-65-A-002-R

DEAN CODY RAY
3746 N FREMONT ST APT 1
CHICAGO, IL 60613

7-2-65-A-003-R

QUINN KEVIN T
54 FRANKLIN ST APT 2
PROVINCETOWN, MA 02657-2054

7-2-65-Z-P03-R

KELLEY GEORGE P ET AL
MICHAEL C SIMPSON
157 A COMMERCIAL ST UNIT 1
PROVINCETOWN, MA 02657

7-2-65-Z-P07-R

HOUSE ANTHONY P
6 CONANT ST
PROVINCETOWN, MA 02657

7-2-65-Z-P08-R

SMITH JOSEPH
87 SEAVER ST
BROOKLINE, MA 02445-5714

7-2-66-0-R

JUDGE ELIZABETH CRAGG ET UX
JAMES PATRICK JUDGE
3 OFF PRESCOTT ST
GROTON, MA 01450

7-2-67-0-E

PROVINCETOWN UNITED METHODIST
CHURCH
PO BOX 311
PROVINCETOWN, MA 02657

7-2-68-0-E

TOWN OF PROVINCETOWN
BOARD OF SELECTMEN
260 COMMERCIAL ST
PROVINCETOWN, MA 02657

7-2-73-0-R

SHEEHAN JR JOHN J ET AL
KEVIN MRAZIK
9 FRITZS WY
PROVINCETOWN, MA 02657

7-2-74-0-R

SHEEHAN JR JOHN J ET AL
KEVIN MRAZIK
9 FRITZS WY
PROVINCETOWN, MA 02657

7-2-75--00A-R

RUIZ ANA
5-UA FRITZS WY
PROVINCETOWN, MA 02657

7-2-75--00B-R

BARREPSKI ERIN
5-UB FRITZS WY
PROVINCETOWN, MA 02657

7-2-76-0-R

GRIFFIN TYLER E B ET AL
BRIAN JOSEPH GRIFFIN
72 ORANGE ST UNIT 2A
PROVIDENCE, RI 02903

7-2-76-A-101-R

MCDONALD KEVIN J
315 EAST NELSON AVE
ALEXANDRIA, VA 22301

7-2-76-A-202-R

RANKIN TIMOTHY SHANE ET VIR
DAVID ALLAN PASS
3701 NORBOURNE BLVD
LOUISVILLE, KY 40207

7-2-79-0-R

TYSZKA ALEXANDRA ET AL
DIANE HUDSON
6 KINGS WAY
PROVINCETOWN, MA 02657

7-2-81-0-E

TOWN OF PROVINCETOWN
BOARD OF FIRE ENGINEERS
25 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-82-0-R

BLUE SUNSHINE REALTY LLC
9 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-83--001-R

CHRISTOPHER E ENOS
9-U1 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-84-1-001-R

SWAIN JONATHAN L ET VIR
ANGEL L HUECA
17 TREMONT ST UNIT 2
CAMBRIDGE, MA 02139

7-2-84-1-002-R

HALEY MARK A
14 DEWOLF ST
DORCHESTER, MA 02125

7-2-84-1-003-R

KENDALL EARL
54 BRADFORD ST #1-4
PROVINCETOWN, MA 02657

7-2-84-1-004-R

KENDALL EARL
54-U1-4 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-2-001-R

FESSLER KEVIN E
54-U2-1 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-2-002-R

HUSTON CORY WAYNE
54 BRADFORD ST #2-2
PROVINCETOWN, MA 02657

7-2-84-2-003-R

PATRINOS VASILIOS
8 RICHARD ST
MEDFORD, MA 02155

7-2-84-2-004-R

ARAGLEN LLC
22 GREEN LN
SPRINGFIELD, MA 01107

7-2-84-2-005-R

GONCALVES J PAUL
54-U2-5 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-2-006-R

ROMANELLI JOSEPH RICHARD
1631 R ST. NW APT C
WASHINGTON, DC 20009

7-2-84-3-001-R

CABRAL BRIAN J
PO BOX 1154
PROVINCETOWN, MA 02657

7-2-84-3-002-R

SMITH JAMES A
68 E BERKLEY ST APT 6
BOSTON, MA 02118

7-2-84-3-003-R

SALEMI JAMES MATTHEW ET VIR
KENNETH JAMES BARTSCHI
209 BEACON ST
HARTFORD, CT 06106

7-2-84-3-004-R

GLOVER GEORGE L III
15 JACLYN DR
COVENTRY, RI 02816-6094

7-2-84-4-00A-R

ESCOLA DANIEL ALAN
54-UA BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-5-00B-R

CHRISTOPHER RONALD J JR ET AL
RONALD SR & PAULA CHRISTOPHER
6 ASHLAND ST UNIT 6
DORCHESTER, MA 02122

7-2-84-6-00C-R

NIEHOFF KARISSA L
C/O VILLEDA RAYMOND ET AL
54-UC BRADFORD ST
PROVINCETOWN, MA 02657

7-2-84-A-002-R

STEPHEN F ENOS
7-U2 SHANK PAINTER RD
PROVINCETOWN, MA 02657

7-2-85-1-001-R

MOUNIC GERARD M
145 EAST 15TH ST APT 1L
NEW YORK, NY 10003

7-2-85-1-002-R

ONEIL CARON ET AL
SUSAN OMALLEY
11 COTTAGE LN
WEYMOUTH, MA 02188

7-2-85-1-003-R

FESSLER KEVIN E
54 U2-1 BRADFORD ST
PROVINCETOWN, MA 02657

7-2-85-1-004-R

WOLPER JEFFREY F
314 W 56TH ST UNIT 2A
NEW YORK, NY 10019

7-2-85-1-005-R

GOMEZ-STARNES FLOYD ET VIR
CARLOS A GOMEZ-STARNES
505 PERSHING DR
SILVER SPRING, MD 20910

7-2-85-1-006-R

CLEMENTS JAMES JOSEPH
14 LINDEN ST
DORCHESTER, MA 02122

7-2-85-2-007-R

JEAN M CATTO TRUST
SCOTT A CATTO TTEE
24 SUMMER ST
YARMOUTHPORT, MA 02675

7-2-85-2-008-R

BECKER ANDREW J ET AL
SCOTT A PYNE
827 WASHINGTON ST #3-A
HOBOKEN, NJ 07030

7-2-85-3-009-R

VENUTI PROPERTIES LLC
6 LA COLLINE DR
MILL NECK, NY 11765

7-2-85-4-010-R

ANCHOR & WINGS, LLC
4850 MONTECITO AVE
SANTA ROSA, CA 95404

7-2-85-5-011-R

JUDY MUPP LLC
832 DURANT PLACE NE
ATLANTA, GA 30308

7-2-86--00A-R

KOBLER BRET G ET VIR
MICHAEL J DOYLE JR
1210 2ND AVE
ASBURY PARK, NJ 07712

7-2-86--00B-R

11 ATLANTIC AVE REALTY TRUST
J M MERRITT & A E KUMPEL TTEES
25 MARLBORO RD
SOUTHBOROUGH, MA 01772

7-2-86--00C-R

EDWARD R LEHMAN LIV TR
EDWARD R LEHMAN TTEE
1807 SOUTH HAYWORTH AVE
LOS ANGELES, CA 90035

APPENDIX F

Stormwater Report

(Submitted Under Separate Cover)

APPENDIX G

Site Photos



Photo 1: Route 6 (Eastbound)



Photo 2: Route 6 (Eastbound) and Shank Painter Rd Intersection



Photo 3: Route 6 and Shank Painter Rd Intersection (Facing Shank Painter Rd)



Photo 4: Route 6 (Eastbound)



Photo 5: Route 6 (Eastbound) Entrance Driveway to Treatment Plant



Photo 6: Route 6 (Eastbound) Near End of Route 6



Photo 7: Route 6 (Westbound) Near Shank Painter Pond Wildlife Sanctuary Trailhead



Photo 8: Route 6 (Westbound)



Photo 9: Route 6 (Westbound) and Shank Painter Road Intersection



Photo 10: Route 6 (Westbound)



Photo 11: Forebay and Detention Pond Location



Photo 12: Shank Painter Road (Southbound) Near Cumberland Farms

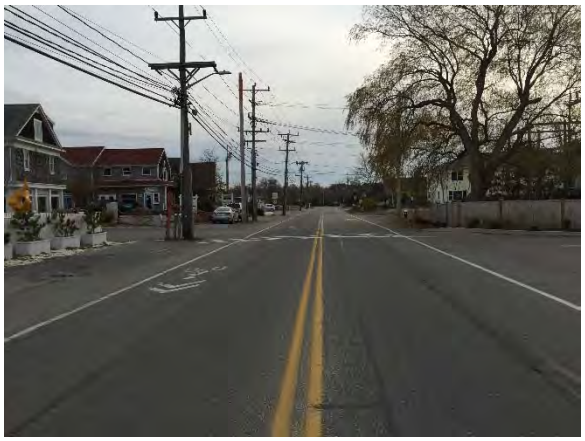


Photo 13: Shank Painter Road (Southbound)
Near Province Landing



Photo 14: Shank Painter Road (Southbound)
Near Stop & Shop



Photo 15: Court Street Wetland Area



Photo 16: Court Street (Westbound)



Photo 17: Court Street (Westbound)



Photo 18: Court Street (Westbound) Flooded



Photo 19: Court Street (Eastbound)



Photo 20: Court Street (Eastbound) Flooded



Photo 21: Shank Painter Rd (Southbound) Near Fire Station



Photo 22: Shank Painter Rd (Southbound)



Photo 23: Winthrop Street Wetland Area



Photo 24: South Shank Painter Wetland Area



Photo 25: Shank Painter Rd (Southbound) Approaching Bradford St Intersection

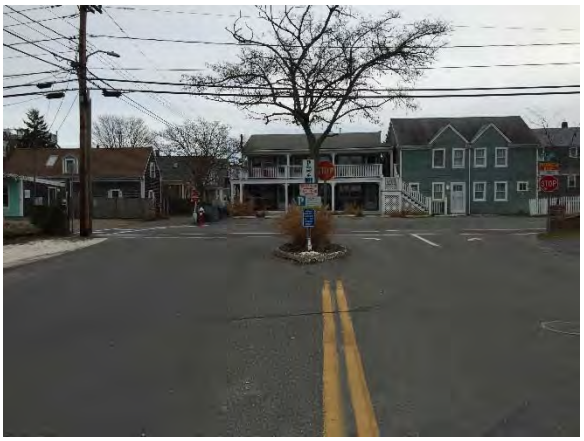
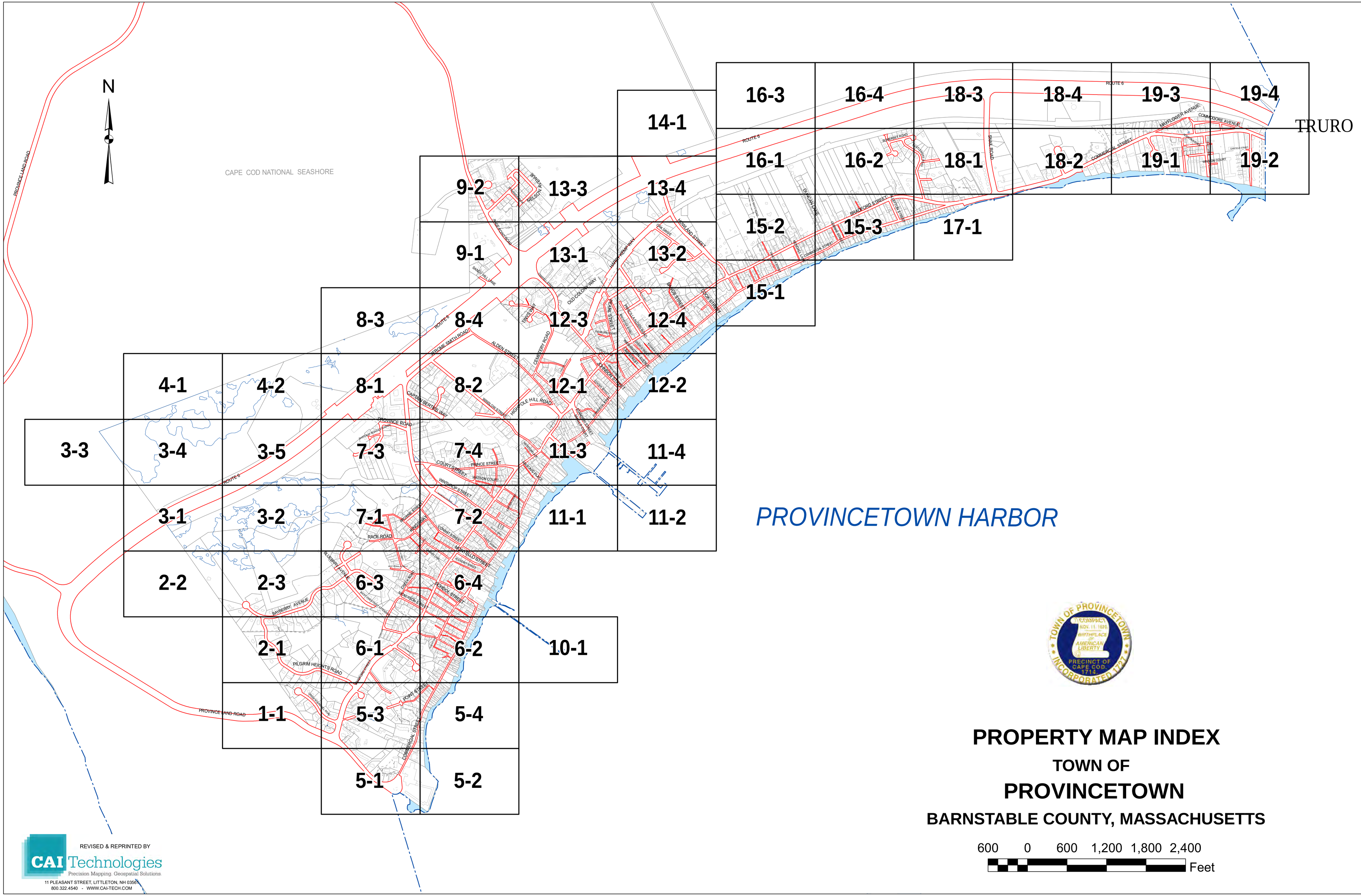


Photo 26: Shank Painter Rd (Southbound) and Bradford St Intersection

APPENDIX H

Assessors Maps



PROVINCETOWN HARBOR

PROPERTY MAP INDEX

TOWN OF

PROVINCETOWN

BARNSTABLE COUNTY, MASSACHUSETTS

600 0 600 1,200 1,800 2,400

Feet

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11 PLEASANT STREET, LITTLETON, NH 03561

800.322.4540 - WWW.CAI-TECH.COM

A08860 - 129

Proposal No. 608744-13464

Tax Map 3-5

PROVINCETOWN

MASSACHUSETTS

CLAPPS POND

P/O 08-1-005

P/O 08-1-015

P/O 07-3-021

P/O 03-5-003

ROUTE 6

N

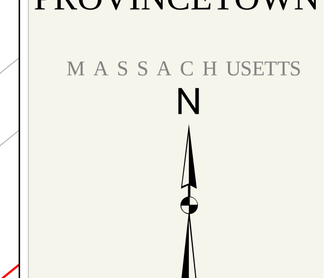
LEGEND

- Parcel
- Original Parcel
- Public Right of Way
- Private Right of Way
- Easement
- Ocean
- High Water Mark
- Wet Area
- 3 — Parcel Number
- 3 — Parcel Number (Disjointed)
- 160 — Dimension
- 160(S) — Scaled Dimension
- (2) — Survey Lot Number

INTENDED FOR ASSESSMENT PURPOSES ONLY. COMPILED FROM TAX MAPS, ORTHOPHOTOGRAPHY AND OTHER PUBLIC RECORDS AND DATA. USERS SHOULD CONSULT THE PUBLIC PRIMARY SOURCE DOCUMENTS FOR VERIFICATION OF THE INFORMATION APPEARING ON THIS MAP.



SHEET INDEX



0 25 50 100 Feet

1 inch = 50 feet

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CAI Technologies
Precision Mapping Geospatial Solutions
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Plot Date: 8/1/2018 Sheet:3-5

Project No. 08014-134412

AXIS 00:00:00 1.50

Tax Map 4-2

PROVINCETOWN

M A S S A C H USETTS

N

P/O
01-0-001

CAPE COD NATIONAL SEASHORE

P/O
08-1-005

224.61

218.23

CLAPPS POND

P/O
03-5-001

122.96

450.04

P/O 08-1-015

126.58

252.71

P/O
03-5-003

ROUTE 6

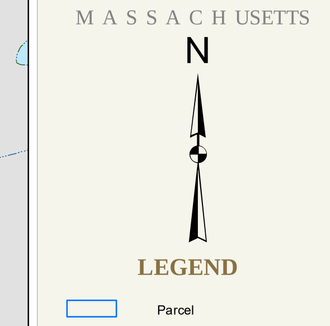
LEGEND

- Parcel
- Original Parcel
- Public Right of Way
- Private Right of Way
- Easement
- Ocean
- High Water Mark
- Wet Area
- 3 — Parcel Number
- 3 — Parcel Number (Disjointed)
- 160 — Dimension
- 160(S) — Scaled Dimension
- (2) — Survey Lot Number

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SHEET INDEX



0 25 50 100 Feet

1 inch = 50 feet

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Parcels as of 6/27/2018

N/0000 - 1/1

Tax Map 7-2

PROVINCETOWN

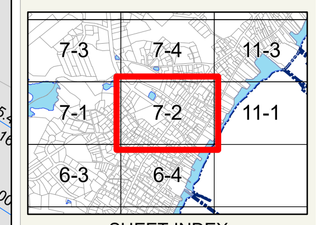
MASSACHUSETTS

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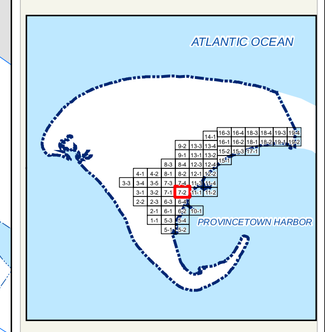
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Proposal No. 608744-136412

Plot Date: 5/21/2020 Sheet 7-3

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1 inch = 50 feet

0 25 50 100

SHEET INDEX

3-2	7-1	
3-5	7-3	7-4
4-2	8-1	8-2

ATLANTIC OCEAN
PROVINCETOWN HARBOR

LEGEND

- Parcel
- Original Parcel
- Public Right of Way
- Private Right of Way
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- High Water Mark
- Wet Area
- 3 — Parcel Number
- 3 — Parcel Number (Disjointed)
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- 160(S) — Scaled Dimension
- (2) — Survey Lot Number

N
MASSACHUSETTS

PROVINCETOWN

Tax Map 7-3

PROVINCETOWN MASSACHUSETTS
INCORPORATED 1714
SEAL
SELECTMEN
BOX 11, 1426
PROVINCETOWN, MASSACHUSETTS
02657
CONSERVATION COMMISSION
PROVINCETOWN, MASSACHUSETTS
02657
BOX 1426
PRECINCT OF PROVINCETOWN
SEAL
LIBRARY
BOX 1426
PROVINCETOWN, MASSACHUSETTS
02657

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133 - 608004

Tax Map 7-3

TOWN OF PROVINCETOWN INCORPORATED 1727 — INCORPORATED NOV. 11, 1620 — MAYFLOWER COMPACT — AMERICAN LIBERTY — PRECINCT OF CAPE COD 1711

PROVINCETOWN

MASSACHUSETTS

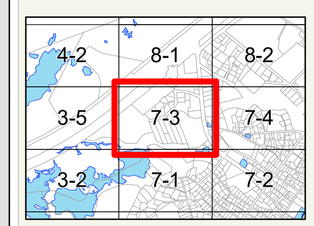
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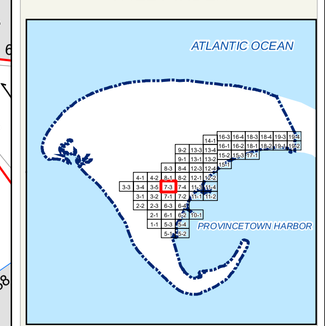
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SHEET INDEX





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Plot Date: 8/1/2018 Sheet: 7-3

Tax Map 7-4

TOWN OF PROVINCETOWN
INCORPORATED FEB. 26 1727
PROVINCETOWN
MASSACHUSETTS

N

LEGEND

- Parcel
- Original Parcel
- Public Right of Way
- Private Right of Way
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8-1	8-2	12-1
7-3	7-4	11-3
7-1	7-2	11-1

ATLANTIC OCEAN
PROVINCE TOWN HARBOR

0 25 50 100 Feet
1 inch = 50 feet

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Proposal No. 4087-13412

Tax Map 8-1

TOWN OF PROVINCETOWN
INCORPORATED 1727
INCORPORATED NOV. 11, 1620
MAYFLOWER COMPACT
AMERICAN LIBERTY
PRECINCT OF CAPE COD
1711

PROVINCETOWN

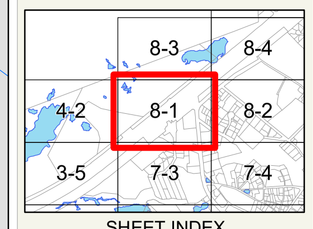
MASSACHUSETTS

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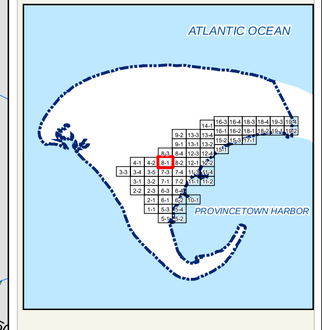
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SHEET INDEX



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Proposal No. 08744-13412

ROUTE 6
ROUTE 6
ROUTE 6
ROUTE 6
JEROME
JEROME
SMITH
ROAD
SHANK
PAINTER
ROAD
SHANK
CAPTAIN
BERTIE'S
WAY
PROVINCE
(PRIVATE WAY)
Access Easement
DRIVEWAY EASMT.
RESERVE SEPTIC EASMT.
R.O.W.
R.O.W.
P/O 08-4-002
P/O 08-2-020
P/O 08-2-019
P/O 08-2-019
P/O 08-2-019
P/O 08-2-001
P/O 07-3-023
P/O 07-3-023-B
P/O 07-3-023-C
P/O 07-3-022
P/O 07-3-021
P/O 03-5-004
P/O 03-5-003
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3
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4-A
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9
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11
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14
15
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(2A)
(3)
(3A)
(4)
(6)
(9)
(10)
(11)
1790.53
1537.94
679.05
735.00
861.28
280
150.00
64.42
188.63
114.72
157.76
191.92
205.00
253.53
141.46
98.96
37.71
155.58
63.07
40.00
45.00
41.50
136.67
80.07
65.59
85.00
80.00
32.89
70.00
203.06
203.15
145.78
161.80
161.03
185.56
109.64
70.50
103.52
30.14
30.06
26.64
42.50
41.72
31.25
97.68
48.17
71.78
12.41
32.37
50.00
104.18
117.50
14.18-A/C
69.45
18.35
63.59
76.07
216.00
150.04
150.00
150.866
128.32
128.43
86.32
95.07
86.03
47.07
50.42
12.10
227
46.59
52.35
36.06
29.82
23.51
20.01
20.56
38.05
275.44
217.52
112.68
107.84
108.47
46.10
84.69
67.47
87.49
99.53
97.50
74.41
73.50
27.02
38.69
150.00
12.00
4.00
55.89
31.31
18.19
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14.35
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861.28
280
1537.94
1790.53
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1537.94
679.05
735.00
861.28
280
150.00
64.42
188.63
114.72
157.76
191.92
205.00
253.53
141.46
98.96
37.71
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161.03
185.56
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30.14
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42.50
41.72
31.25
97.68
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71.78
12.41
32.37
50.00
104.18
117.50
14.18-A/C
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18.35
63.59
76.07
216.00
150.04
150.00
150.866
128.32
128.43
86.32
95.07
86.03
47.07
50.42
12.10
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29.82
23.51
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275.44
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74.41
73.50
27.02
38.69
150.00
12.00
4.00
55.89
31.31
18.19
15.49
30.27
33.35
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52.35

Tax Map 8-2

PROVINCETOWN

MASSACHUSETTS

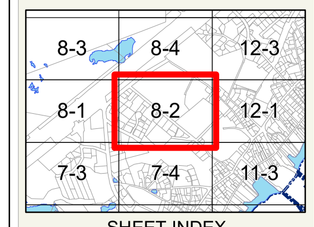
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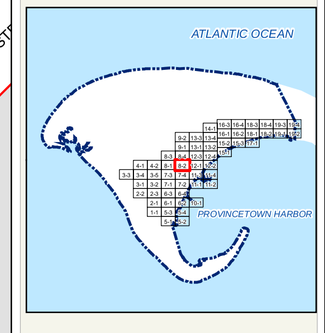
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SHEET INDEX





0 25 50 100 Feet

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Project No. 08-714-13412

Tax Map 8-3

PROVINCETOWN

M A S S A C H USETTS

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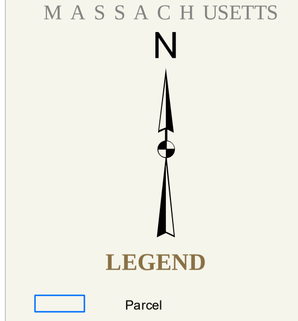
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P/O 01-0-001

CAPE COD NATIONAL SEASHORE

P/O 08-4-002

(M)

349.39

DUCK POND

2000

P/O 08-1-005

P/O 08-4-002

ROUTE 6

ROUTE 6

AM0080 - 138

Proposal No: 6937441-136413

Tax Map 8-4

PROVINCETOWN

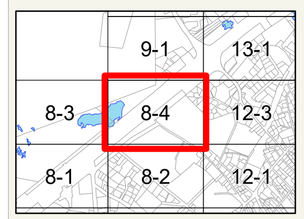
MASSACHUSETTS

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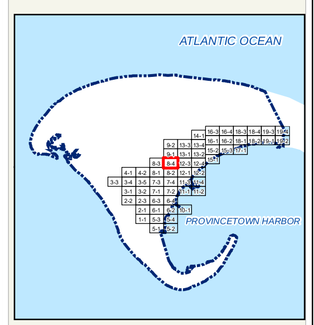
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A008060 - 139

Proposal No. 608744-136412

APPENDIX I

NHESP Proof of Mailing

Proposal No. 608744-136412

Check Date: 12/12/2024

589264

	Amount	Discounts	Previous Pay	Net Amount
	300.00			300.00
L	300.00			300.00

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- Adult Signature Required $
- Adult Signature Restricted Delivery $

Postage $10.95

Total Postage and Fees

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City, State, ZIP+4®: Westboro, MA 01581

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

WINCHBURN, MA 01801-9998
JAN 22 2025
Postmark Here
01/07/2025

Maria George

From: Holt, Emily (FWE) <emily.holt@mass.gov>
Sent: Wednesday, January 29, 2025 12:38 PM
To: Maria George
Cc: McGuire, Timothy (FWE)
Subject: [EXT] Route 6 between Province Lands Road and Shank Painter Road [Filed 29 Jan 2025 15:57]

Categories: Filed by Mail Manager

CAUTION

The Division is in receipt of the filing for the above-referenced project.

Could you reply all to this email with an electronic copy of the complete filing (including all attachments) to assist in our review?

Thank you,

Emily Holt
Endangered Species Review Assistant
Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6385 | f: (508) 389-7890
mass.gov/nhesp

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MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

June 27, 2025

Braden Witt
Town of Provincetown
260 Commercial Street
Provincetown, Massachusetts 02657

RE: Applicant: Braden Witt, Town of Provincetown
Project Location: Route 6 between Province Lands Road and Shank Painter Road
Project Description: Road Reconstruction
NHESP File No.: 25-19242

Dear Applicant:

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife (the "Division") received the MESA Project Review Checklist and supporting documentation for review pursuant to the Massachusetts Endangered Species Act (MGL. c. 131A) and its implementing regulations (321 CMR 10.00) (MESA).

STATE-LISTED SPECIES
The Project as currently proposed will occur within Priority Habitat of the following state-listed species:

Scientific Name	Common Name	Taxonomic Group	State Status
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern
Papaipema sulphurata	Water-willow Stem Borer	Butterfly/Moth	Threatened
Carex oligosperma	Few-seeded Sedge	Plant	Endangered

State-listed species and their habitats are protected in accordance with the MESA.

PROJECT DESCRIPTION (the "Project")
The project, as currently proposed, includes the reconstruction of the 4-lane Route 6 corridor into a 2-lane highway and shared use path as shown on the Project Plan.

MASSACHUSETTS ENDANGERED SPECIES ACT (MESA)
The MESA is administered by the Division and prohibits the Take of state-listed species, which includes actions that

"in reference to animals, means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of habitat of state-listed wildlife species" (321 CMR 10.02). The purpose of the Division's review under the MESA regulations is to determine whether a Take of state-listed species will result from the proposed project.

Based on the information provided and the information contained in our database, the Division finds that the Project **must be conditioned** to avoid a prohibited Take of state-listed species (321 CMR 10.18(2)(a)). **To avoid a prohibited Take of state-listed species, the conditions attached to this letter must be met.**

Provided the attached conditions are fully implemented and there are no changes to the project plans, this project will not result in a Take of state-listed species. We note that all work is subject to the anti-segmentation provisions (321 CMR 10.16) of the MESA. This determination is a final decision of the Division of Fisheries and Wildlife pursuant to 321 CMR 10.18. Any changes to the proposed project or any additional work beyond that shown on the site plans may require an additional filing with the Division pursuant to the MESA. This project may be subject to further review if no physical work is commenced within five years from the date of issuance of this determination, or if there is a change to the project.

If you have any questions regarding this letter please contact Tim McGuire Endangered Species Review Biologist, at timothy.mcguire2@mass.gov, (508)389-6366.

Sincerely,



Jesse Leddick
Assistant Director

cc: Maria George, Apex Companies, LLC

Attachment: List of Conditions

List of Conditions

Applicant: Braden Witt, Town of Provincetown
Project Location: Route 6 between Province Lands Road and Shank Painter Road
Project Description: Road Reconstruction
NHESP File No.: 25-19242
Heritage Hub Form ID: RC-91651
Approved Plan: Massachusetts Department of Transportation Highway Division Plan and Profile of Shank Painter Road and Route 6
Plan date: 10/3/24

To avoid a prohibited Take of state-listed species, the following condition(s) must be met:

1. **Turtle Protection Plan:** Prior to the start of work (including vegetation clearing or soil disturbance), the Applicant shall submit an Eastern Box Turtle Protection Plan to the Division for review and written approval. Said Plan shall detail procedures for protecting state-listed turtles during construction, and be prepared and implemented by a qualified, Division-approved wildlife biologist. The Division is available for consultation on Plan development and can provide contact information for qualified biologists. The Division-approved Plan shall be implemented as written; any proposed changes to the Plan must be submitted to the Division for review and written approval prior to implementation of said changes. By December 31st of any year in which work occurs, the qualified biologist shall submit: a) a summary report to the Division detailing project status and compliance with the Plan; and b) any observations of state-listed turtles at https://www.mass.gov/how-to/report-rare-species-vernal-pool-observations.

APPENDIX J

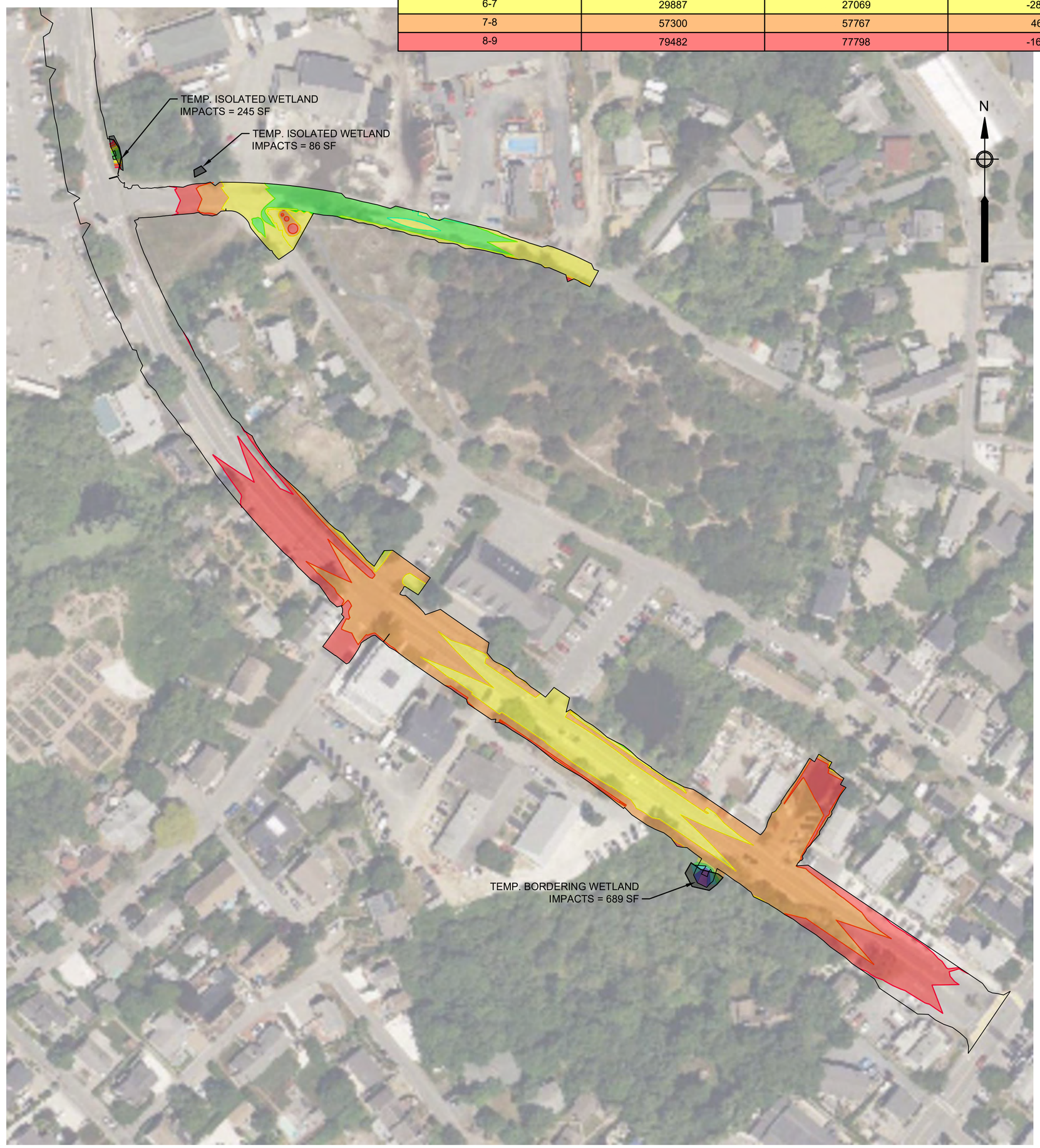
Compensatory Storage and Wetland Impact Area

TEMPORARY WETLAND IMPACTS (SF)	TEMPORARY WETLAND IMPACTS (SF)	WETLAND LOSS / REPLICATION (SF)
Court Street Outfall	245	10.5 / 10.5
Court Street Overflow	86	0 / 0
South Shank Painter	689	34.3 / 38

COMPENSATORY STORAGE VOLUMES			
CONTOUR INTERVAL (FT)	EXISTING STORAGE VOL. (CF)	PROPOSED STORAGE VOL. (CF)	STORAGE DIFFERENCE (CF)
2-3	0	135	135
3-4	81	261	180
4-5	220	372	152
5-6	5783	6317	534
6-7	29887	27069	-2818
7-8	57300	57767	467
8-9	79482	77798	-1684



EXISTING CONDITIONS
SCALE:1 = 80'



PROPOSED CONDITIONS
SCALE:1 = 80'

MARK	DATE	DESCRIPTION

Scale	1 = 80'
Date	OCTOBER 2024
Job No.	22007741
Designed by	LKH
Drawn by	LKH
Checked by	MEG
Approved by	RJP

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

SHANK PAINTER ROAD ROADWAY AND DRAINAGE PROJECT

TOWN OF PROVINCETOWN, MA

PROPOSED VS. EXISTING COMPENSATORY STORAGE AND WETLAND IMPACTS

FOR PERMITTING

Sheet No.

FIG. 1

AW8860 - 151

Proposal No. 608744-136412

Drawing file: I:\Provincetown,115\115-1601 Shank Painter Road\Drainage\06 Permitting\NOI and MESA\Sept 2024 NOI Updates\Compensatory Storage & Wetland Figures\Comp Storage and Disturbance Figures_v2_recover.dwg Plot Date: May 05,2025-7:37pm

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

PLAN AND PROFILE OF

SHANK PAINTER ROAD AND ROUTE 6

IN THE TOWN OF

PROVINCETOWN

BARNSTABLE COUNTY

FEDERAL AID PROJECT NO.

100% SUBMITTAL

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	001	288
PROJECT FILE NO.	608744		

TITLE SHEET & INDEX

608744_HD(TITLE).DWG Plotted on 3-Oct-2024 7:50 AM

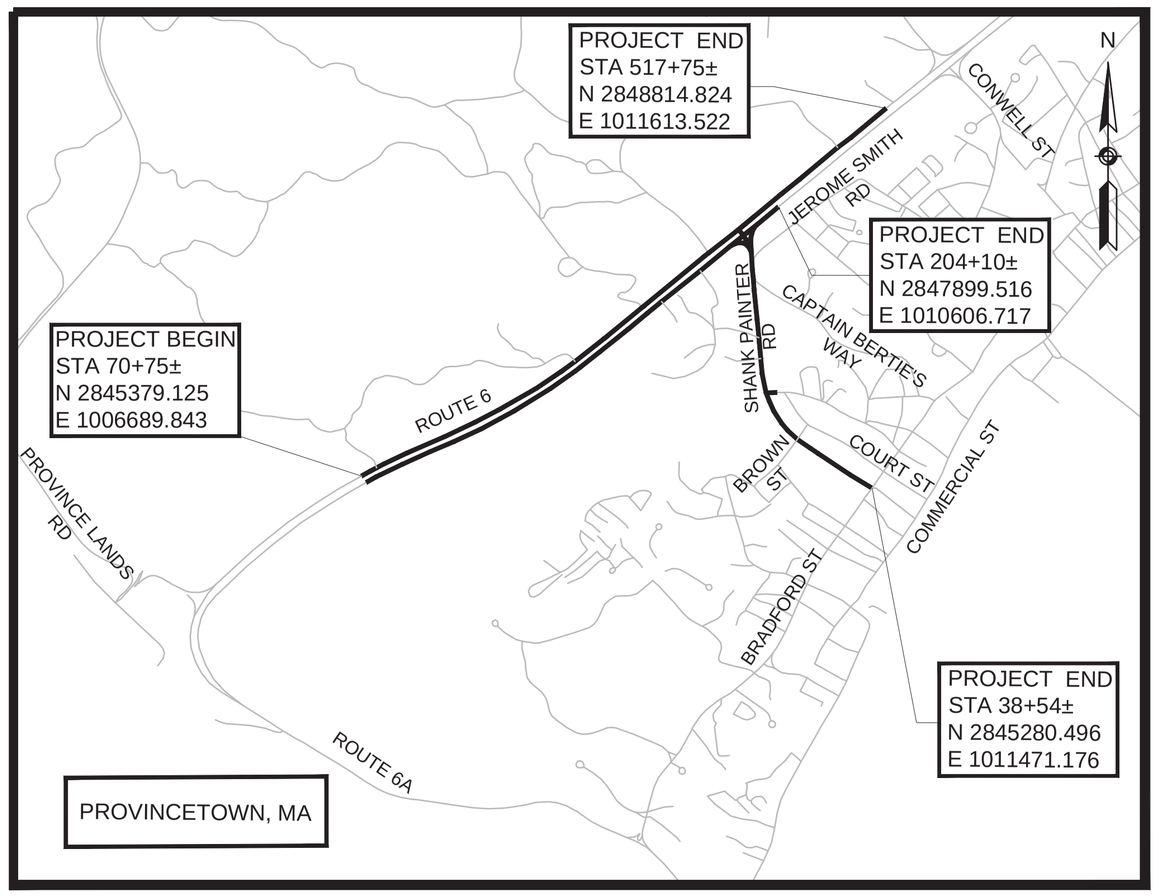
Proposal No. 608744-136412

AM8869 - 152

INDEX

SHEET NO.	DESCRIPTION
001	TITLE SHEET & INDEX
002	LEGEND & ABBREVIATIONS
003	KEY PLAN & BORING LOCATIONS
004-006	GENERAL NOTES & BORING LOGS
007-010	TYPICAL SECTIONS
* 011-023	SURVEY CONTROL PLANS - ROUTE 6
* 024-029	SURVEY CONTROL PLANS - SHANK PAINTER ROAD
030-042	CONSTRUCTION PLANS - ROUTE 6
043-048	CONSTRUCTION PLANS - SHANK PAINTER ROAD
* 049-055	PROFILE - ROUTE 6
* 056-061	PROFILE - ROUTE 6 - PEDESTRIAN AND BIKE PATH
* 062-067	PROFILE - SHANK PAINTER ROAD
* 068-070	PROFILES - SIDE STREETS
* 071-083	CURB TIE PLANS - ROUTE 6
* 084-089	CURB TIE PLANS - SHANK PAINTER ROAD
090-102	GRADING PLANS - ROUTE 6
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* 109-116	TRAFFIC SIGN & PAVEMENT MARKING PLANS - ROUTE 6
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* 120-121	TRAFFIC SIGN SUMMARY
* 122-125	TEMPORARY TRAFFIC CONTROL PLANS
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* 176-178	DRIVEWAY DETAILS
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* 187-219	CROSS SECTIONS - ROUTE 6 COMBINED
* 220-251	CROSS SECTIONS - PEDESTRIAN AND BIKE PATH
* 252-254	CROSS SECTIONS - ROUTE 6 EASTBOUND
* 255-257	CROSS SECTIONS - ROUTE 6 WESTBOUND
* 258-263	CROSS SECTIONS - ROUNDABOUT
* 264-287	CROSS SECTIONS - SHANK PAINTER ROAD
* 288	CROSS SECTIONS - COURT STREET

* PLANS NOT PROVIDED AS PART OF THE NOI SUBMITTAL



0 1000 2000 3000 4000

SCALE: 1" = 1000'

LENGTH OF PROJECT
ROUTE 6 = 6562± FEET = 1.24 MILES
SHANK PAINTER ROAD = 2925± FEET = 0.55 MILES

THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 2024, THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE 1996 CONSTRUCTION AND TRAFFIC STANDARD DETAILS (AS RELATES TO TRAFFIC STANDARD DETAILS ONLY), MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 2023 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), MASSACHUSETTS AMENDMENTS TO THE 2009 MUTCD AND THE STANDARD MUNICIPAL TRAFFIC CODE, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING; THE LATEST EDITION OF AMERICAN STANDARD FOR NURSERY STOCK, WILL GOVERN.

DESIGN DESIGNATION	SHANK PAINTER ROAD	ROUTE 6
DESIGN SPEED	30 MPH	45 MPH
ADT (2019)	8,889	11,340
ADT (2029)	9,343	11,920
K	8.1%	8.0%
D	55% NB	55% EB
T (PEAK HOUR)	2.6%	2.0%
T (AVERAGE DAY)	1.8%	1.0%
DHV	760	956
DDHV	415	525
FUNCTIONAL CLASSIFICATION	URBAN MINOR ARTERIAL	URBAN PRINCIPAL ARTERIAL

DATE	DESCRIPTION	REV #

COMMONWEALTH OF MASSACHUSETTS
RYAN J. PAUL
CIVIL
No. 51127
REGISTERED PROFESSIONAL ENGINEER

APEX

massDOT Massachusetts Department of Transportation Highway Division

RECOMMENDED FOR APPROVAL

CHIEF ENGINEER ____ DATE ____

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR ____ DATE ____

APPROVED

HIGHWAY ADMINISTRATOR ____ DATE ____

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
C	C	CABLE MANHOLE
D	D	DRAINAGE MANHOLE
E	E	ELECTRIC MANHOLE
G	G	GAS MANHOLE
M	M	MISC MANHOLE
S	S	SEWER MANHOLE
T	T	TELEPHONE MANHOLE
W	W	WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
x	x	CHAIN LINK OR METAL FENCE
		WOOD FENCE
		SEDIMENT CONTROL BARRIER
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
1	1	CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
		EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RRSG	RAILROAD SIGNAL
OR		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
	20'	MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROL CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE
	CW	CROSSWALK
	SWL	SOLID WHITE LINE
	SYL	SOLID YELLOW LINE
	BWL	BROKEN WHITE LINE (10' LINE SEGMENT WITH 30' GAPS)
	BYL	BROKEN YELLOW LINE (10' LINE SEGMENT WITH 30' GAPS)
	DWL	DOTTED WHITE LINE (3' LINE SEGMENT WITH 9' GAPS)
	DYL	DOTTED YELLOW LINE (3' LINE SEGMENT WITH 9' GAPS)
	DWLEx	DOTTED WHITE LINE EXTENSION (2' LINE SEGMENT WITH 6' GAPS)
	DYLEx	DOTTED YELLOW LINE EXTENSION (2' LINE SEGMENT WITH 6' GAPS)
	DWREL	12" WIDE DOTTED WHITE ROUNDABOUT ENTRY LINE (2' LINE SEGMENT WITH 2' GAPS)
	DBWL	DOUBLE WHITE LINE
	DBYL	DOUBLE YELLOW LINE

NOTE:
EXCEPT WHERE NOTED ON THE PLANS, ALL PAVEMENT MARKINGS SHALL BE 6 INCHES WIDE. EXCEPTION APPLIES TO PAVEMENT MARKINGS WITHIN THE BICYCLE PATH, WHERE MARKINGS MAY BE 4 INCHES WIDE.

UTILITY COLOR GUIDE

UTILITY	LINE COLOR	EXISTING	PROPOSED
ELECTRIC	RED		
GAS-OIL-STEAM	BROWN		
COMMUNICATION / CATV	ORANGE		
POTABLE WATER	BLUE		
SEWER	GREEN		
DRAINAGE	TRADITIONAL GRAYSCALE		

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY

ABBREVIATIONS (cont.)

GENERAL

R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WCR	WHEEL CHAIR RAMP
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL ABBREVIATIONS

CAB	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY UPRAISED HAND
FDW	FLASHING UPRAISED HAND
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR YELLOW
FYL	FLASHING YELLOW LEFT ARROW
FYR	FLASHING YELLOW RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILT, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALKING PERSON
Y	STEADY CIRCULAR YELLOW
YL	STEADY YELLOW LEFT ARROW

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	002	288
PROJECT FILE NO.	608744		

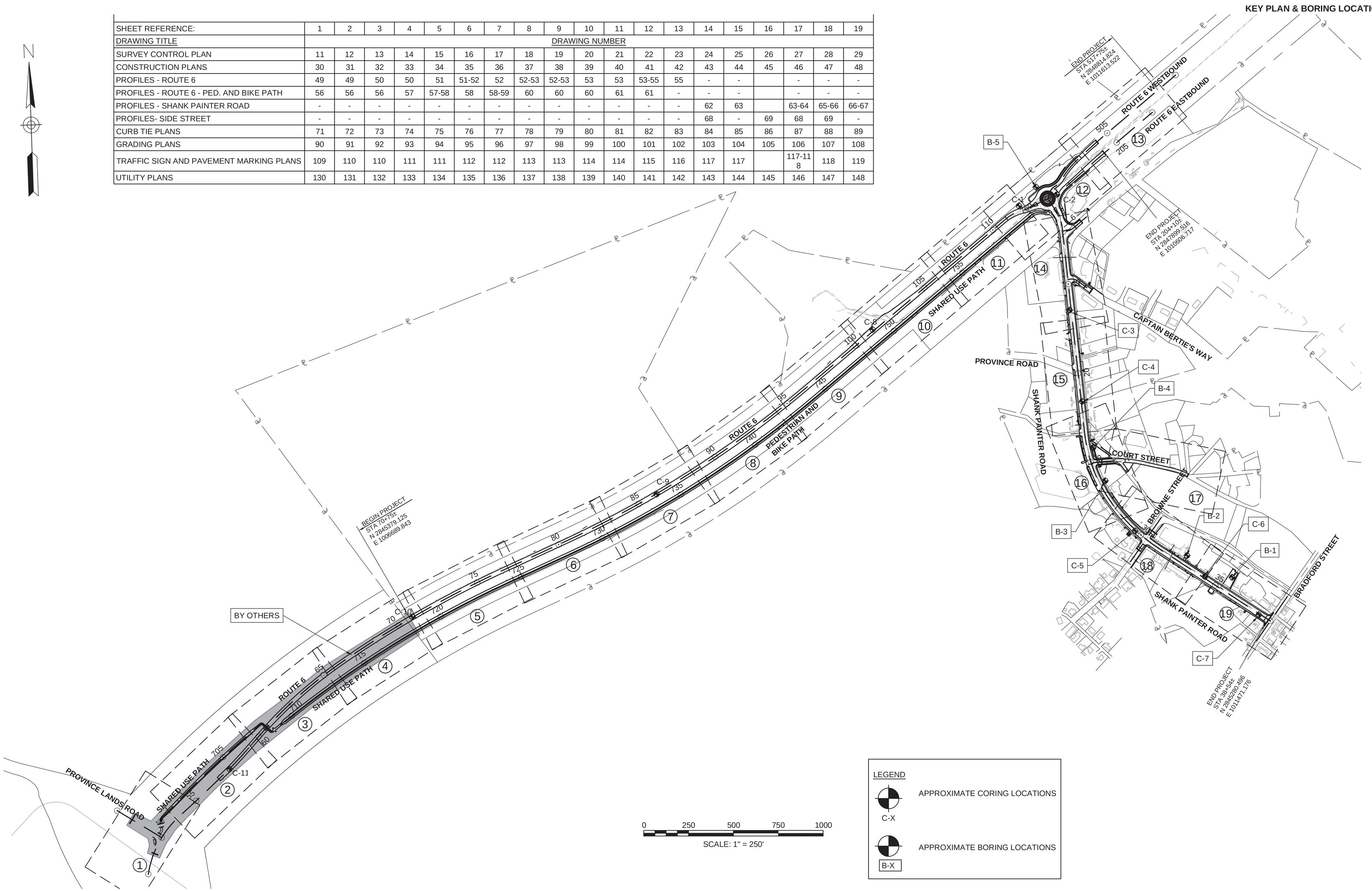
LEGEND & ABBREVIATIONS

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	003	280
PROJECT FILE NO.	608744		

KEY PLAN & BORING LOCATIONS

SHEET REFERENCE:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
DRAWING TITLE	DRAWING NUMBER																		
SURVEY CONTROL PLAN	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
CONSTRUCTION PLANS	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
PROFILES - ROUTE 6	49	49	50	50	51	51-52	52	52-53	52-53	53	53	53-55	55	-	-		-	-	-
PROFILES - ROUTE 6 - PED. AND BIKE PATH	56	56	56	57	57-58	58	58-59	60	60	60	61	61	-	-	-		-	-	-
PROFILES - SHANK PAINTER ROAD	-	-	-	-	-	-	-	-	-	-	-	-	-	62	63		63-64	65-66	66-67
PROFILES- SIDE STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	68	-	69	68	69	-
CURB TIE PLANS	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
GRADING PLANS	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
TRAFFIC SIGN AND PAVEMENT MARKING PLANS	109	110	110	111	111	112	112	113	113	114	114	115	116	117	117		117-118	118	119
UTILITY PLANS	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148



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Proposal No. 608744-136412
A000860 - 154

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	004	288
PROJECT FILE NO.	608744		

GENERAL NOTES

SURVEY NOTES:

1. THE BOUNDARY, RIGHT-OF-WAY AND TOPOGRAPHIC INFORMATION ALONG SHANK PAINTER ROAD AND ITS INTERSECTION WITH ROUTE 6 SHOWN HEREON IS BASED ON AN ON-THE-GROUND SURVEY PERFORMED BY ALLEN & MAJOR ASSOCIATES,INC. BETWEEN SEPTEMBER AND OCTOBER 2018. ADDITIONAL SURVEY ALONG ROUTE 6 WAS PERFORMED BY JC ENGINEERING BETWEEN NOVEMBER 2018 AND DECEMBER 2018 AND INCORPORATED INTO THE BASE PLAN.
2. BEARINGS AND DISTANCES AND THE COORDINATES THEY ARE BASED ON SHOWN ON THIS PLAN ARE IN U.S. SURVEY FEET IN THE MA. STATE PLANE COORDINATE SYSTEM REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), CORS ADJUSTMENT (NA2011/GEOID 12A) AS DETERMINED BY GPS OBSERVATIONS PERFORMED IN NOVEMBER OF 2016 UTILIZING MAINE TECHNICAL SOURCE RTK GPS NETWORK.
3. THE VERTICAL DATUM FOR THIS PROJECT IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), CORS ADJUSTMENT (NA2011/GEOID 12A) AS DETERMINED BY REDUNDANT GPS OBSERVATIONS PERFORMED IN NOVEMBER OF 2016 UTILIZING THE MAINE TECHNICAL SOURCE RTK GPS NETWORK.
4. THE ACCURACY OF MEASURED PIPE INVERTS AND PIPE SIZES IS SUBJECT TO FIELD CONDITIONS, THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS AND OTHER CONDITIONS.
5. SUBSURFACE UTILITY ENGINEERING LEVEL B WAS PERFORMED BY FELDMAN GEOSPATIAL BETWEEN FEBRUARY 2024 AND MARCH 2024.
6. WETLAND DELINEATION WAS COMPLETED BY PINEBROOK CONSULTING IN OCTOBER 2016 ON SHANK PAINTER ROAD, AND DECEMBER 2018 ON ROUTE 6.
7. FEMA FLOODZONE AE HAS A BASE FLOOD ELEVATION OF 9.0', ACCORDING TO FEMA FLOODMAP 25001C0112J, EFFECTIVE 7/16/2014.

GENERAL CONSTRUCTION NOTES:

1. CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE FOLLOWING: THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 2024. THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, TOWN OF PROVINCETOWN DEPARTMENT OF PUBLIC WORKS CONSTRUCTION STANDARDS DATED APRIL, 2016, THE 1996 CONSTRUCTION AND TRAFFIC STANDARD DETAILS (AS RELATES TO TRAFFIC STANDARD DETAILS ONLY), MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR AND HIGHWAYS DATED 2023 AND MASSACHUSETTS AMENDMENTS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.
2. IT IS THE INTENT OF THE DESIGN TO PROVIDE A MINIMUM CONSTRUCTED SIDEWALK WIDTH FOR A PATH OF TRAVEL PAST ALL OBSTRUCTIONS OF 3'-0" CLEARANCE FOR HANDICAP ACCESSIBILITY (IN ACCORDANCE WITH THE LATEST A.D.A. AND MASSDOT REQUIREMENTS). THE CONTRACTOR SHALL VERIFY THAT ALL POTENTIAL OBSTRUCTIONS HAVE BEEN ADDRESSED IN THE PLANS INCLUDING BUT NOT LIMITED TO FOUNDATIONS, SIGNS, MAILBOXES, UTILITY POLES, AND HYDRANTS SO THEY ARE LOCATED TO PROVIDE THIS MINIMUM PATH OF TRAVEL CLEARANCE AND A MINIMUM 18" TYPICAL CLEARANCE TO THE FACE OF CURB OR 12" MIN. CLEARANCE WHERE 18" IS NOT FEASIBLE OR PRACTICAL. NO UTILITY POLES OR OBSTRUCTIONS ARE PERMITTED WITHIN WHEELCHAIR RAMPS.
3. THE TERM "PROPOSED" (PROP) MEANS WORK TO BE CONSTRUCTED HEREIN USING NEW MATERIALS OR WHERE APPLICABLE, REUSING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET" (R&R). ALL OTHER MATERIALS SHALL BE "REMOVED AND DISCARDED" (R&D) OR DISPOSED OF OFF SITE WITH THE EXCEPTION OF MATERIALS LABELED AS "REMOVED AND STACKED" (R&S) WHICH SHALL BE TRANSPORTED AND AND STACKED AT A LOCATION DESIGNATED BY THE TOWN AND OR ENGINEER.
4. MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS, PAY ALL FEES INCLUDING POLICE DETAILS AND POST ALL BONDS, IF NECESSARY, ASSOCIATED WITH THE SAME, AND COORDINATE WITH THE OWNER AND THE ENGINEER.
5. THE CONTRACTOR SHALL NOT STORE ANY APPARATUS, MATERIALS, SUPPLIES, OR EQUIPMENT ON DRAINAGE STRUCTURES, PRIVATE PROPERTY OR WITHIN 100 FEET OF WETLANDS, UNLESS DIRECTED TO DO SO BY THE CONTRACT DOCUMENTS.
6. PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL PERFORM HIGH QUALITY AUDIO & VIDEO RECORDING OF THE EXISTING PRE-CONSTRUCTION CONDITION OF THE PROJECT AREA AND SUBMIT TO THE TOWN FOR REVIEW AND APPROVAL. (SEE SPECIAL PROVISIONS FOR SCOPE & REQUIREMENT DETAILS, THE COST FOR THIS TASK SHALL BE CONSIDERED INCIDENTAL TO THIS PROJECT. NO PAYMENT SHALL BE REQUESTED TO THE TOWN AND OR ENGINEER.)
7. HIGH QUALITY AUDIO & VIDEO RECORDING SHALL BE SUBMIT TO THE ENGINEER TO REVIEW AND APPROVAL AT LEAST 2 WEEKS PRIOR TO THE COMMENCEMENT OF ANY WORK.
8. ALL EXISTING CONDITIONS SHOWN ARE APPROXIMATE AND ARE BASED ON THE BEST INFORMATION AVAILABLE. PRIOR TO THE START CONSTRUCTION VERIFY THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLING ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.
9. DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. ANY FIELD ADJUSTMENTS REQUIRED WILL BE MADE AS APPROVED OR DIRECTED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR THE CONSTRUCTABILITY OF THE DRAINAGE SYSTEM SHALL ANY STRUCTURES BE ORDERED. ANY FIELD ADJUSTMENTS TO LINE & GRADE UP TO A DEPTH OF 5' SHALL BE INCLUDED IN THE COST OF THE PIPE. PIPE EXCAVATION GREATER THAN 5' WILL BE PAID UNDER CLASS B TRENCH EXCAVATION.
10. THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS INDICATED ON THE DRAWINGS ARE BASED ON RECORDS OF VARIOUS UTILITY COMPANIES, AND WHEREVER POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES IN THE FIELD PRIOR TO THE START OF CONSTRUCTION. CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY IN THE TOWN, AND "DIGSAFE" (1-888-344-7233) AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES. THE CONTRACTOR MUST RESOLVE CONFLICTS BETWEEN THE PROPOSED UTILITIES AND FIELD-LOCATED UTILITIES AND REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED, INCOMPLETELY OR INACCURATELY SHOWN. THE CONTRACTOR MUST MAINTAIN ACCURATE RECORDS OF THE LOCATION AND ELEVATION OF ALL WORK INSTALLED AND EXISTING UTILITIES FOUND DURING CONSTRUCTION FOR THE PREPARATION OF THE AS-BUILT PLAN.
11. THE CONTRACTOR SHALL COORDINATE ALL ARRANGEMENTS FOR THE ALTERATION AND OR ADJUSTMENT OF ELECTRIC, TELEPHONE, GAS AND ANY OTHER PRIVATE UTILITY.
12. SHOULD AN EXISTING UTILITY BE FOUND TO BE IN CONFLICT WITH THE PROPOSED WORK, THE LOCATION, SIZE AND TYPE SHALL BE ACCURATELY DETERMINED WITHOUT DELAY, BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE TOWN AND OR ENGINEER FOR RESOLUTION OF THE CONFLICT.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING OR REMODELING ALL DRAINAGE, WATER, OR SEWER STRUCTURES TO THE FINISHED ELEVATION, WITHIN THE LIMITS OF THE PROJECT, UNLESS OTHERWISE NOTED.
14. THE CONTRACTOR SHALL PERFORM TEST PITS AT LOCATIONS SHOWN ON PLANS AND AS DIRECTED BY THE TOWN AND OR ENGINEER AT THE STARTING OF THE PROJECT TO DETERMINE ANY POTENTIAL UTILITY CONFLICT IN ADVANCE SO ANY CONFLICT CAN BE RESOLVED IN TIME WITH THE TOWN AND/OR ENGINEER FOR ALTERNATIVES.
15. THE CONTRACTOR MUST MAINTAIN ALL EXISTING UTILITIES IN WORKING ORDER AND FREE FROM DAMAGE DURING THE ENTIRE DURATION OF THE PROJECT. REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR ALL COST RELATED TO THE REPAIR OF UTILITIES. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES MUST BE DONE BY HAND.

GENERAL NOTES CONTINUED:

16. COORDINATE ALL TRENCHING WORK WITHIN ROADWAYS WITH THE PROPER LOCAL & STATE AGENCY. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRENCH SAFETY INCLUDING ANY LOCAL AND/OR STATE PERMITS REQUIRED FOR THE TRENCH WORK. IF THIS WORK IS REQUIRED TO OCCUR OUTSIDE THE AGREED UPON HOURS OF OPERATION FOR THE FACILITY, THE CONTRACTOR MUST PLAN ACCORDINGLY.
17. INSTALL ALL UTILITY TRENCH WORK PRIOR TO INSTALLING NEW PAVEMENT AS INDICATED ON THE DRAWINGS.
18. IMPORT ONLY CLEAN MATERIAL. MATERIAL FROM AN EXISTING OR FORMER 21E SITE AS DEFINED BY THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.0000 WILL NOT BE ACCEPTED .
19. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH AND MAINTAIN ALL CONTROL POINTS AND BENCHMARKS DURING CONSTRUCTION INCLUDING BENCHMARK LOCATIONS AND ELEVATIONS AT CRITICAL AREAS. COORDINATE WITH THE ENGINEER THE LOCATION OF ALL CONTROL POINTS AND BENCHMARKS.
20. SITE LAYOUT SURVEY REQUIRED FOR CONSTRUCTION MUST BE PROVIDED BY THE CONTRACTOR AND PERFORMED BY A MASSACHUSETTS' REGISTERED PROFESSIONAL LAND SURVEYOR. AS INCIDENTAL TO THIS PROJECT THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE SURVEYOR FOR ALL SITE SURVEY WORK.
21. MAINTAIN ALL GRADE STAKES SET BY THE SURVEYOR. GRADE STAKES ARE TO REMAIN UNTIL A FINAL INSPECTION OF THE ITEM HAS BEEN COMPLETED BY THE ENGINEER. RE-STAKING OF PREVIOUSLY SURVEYED SITE FEATURES IS THE RESPONSIBILITY (INCLUDING COST) OF THE CONTRACTOR.
22. PROVIDE ALL CONSTRUCTION SERVICE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING NOISE, VIBRATION, DUST, SEDIMENTATION CONTAINMENT, AND TRENCH WORK.
23. COLLECT SOLID WASTES AND STORE IN A SECURED DUMPSTER. THE DUMPSTER MUST MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS.
24. REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. PROMPTLY REMOVE ALL DEMOLITION DEBRIS FROM THE SITE TO AN APPROVED DUMP SITE.
25. ALL TRUCKS LEAVING THE SITE MUST BE COVERED.
26. DO NOT WASH ANY CONCRETE TRUCKS ONSITE. REMOVE BY HAND ANY CEMENT OR CONCRETE DEBRIS LEFT IN THE DISTURBED AREA.
27. BURIAL OF ANY STUMPS, SOLID DEBRIS, AND/OR STONES/BOULDERS ONSITE IS PROHIBITED.
28. IMMEDIATELY CONTACT AND COORDINATE WITH THE ENGINEER AND OWNER IF ANY DEVIATION OR ALTERATION OF THE WORK PROPOSED ON THESE DRAWINGS IS REQUIRED.
29. AT THE END OF CONSTRUCTION, REMOVE ALL CONSTRUCTION DEBRIS AND SURPLUS MATERIALS FROM THE SITE PERFORM A THOROUGH INSPECTION OF THE WORK PERIMETER. COLLECT AND REMOVE ALL MATERIALS AND BLOWN OR WATER CARRIED DEBRIS FROM THE SITE.
30. THE CONTRACTOR SHALL PROVIDE FOR THE SAFE AND ORDERLY PASSAGE OF VEHICULAR AND PEDESTRIAN TRAFFIC IN AREAS UNDER CONSTRUCTION.
31. SHOP DRAWINGS OF ALL CASTINGS, PRECAST CONCRETE STRUCTURES, PIPE AND MANUFACTURED COMPONENTS SHALL BE SUBMITTED FOR APPROVAL BEFORE ORDERING.
32. ALL PROPOSED PAVEMENT MARKINGS SHALL MEET EXISTING MARKINGS AT THE LIMITS OF WORK.
33. DETECTABLE WARNING PANELS SHALL BE INSTALLED ON ALL WHEELCHAIR RAMPS AND SHALL COMPLY WITH CONSTRUCTION STANDARD E 107.6.5. PAYMENT FOR DETECTABLE WARNING PANELS SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION OF THE WHEELCHAIR RAMPS OR SIDEWALKS IN WHICH THEY ARE BEING INSTALLED. THE COLOR OF DETECTABLE WARNING PANELS SHALL BE AT THE DIRECTION OF THE TOWN AND OR ENGINEER.
34. SEE SIGNS AND PAVEMENT MARKING PLANS FOR PROPOSED SIGNS AND DISPOSITION OF THE EXISTING SIGNS WITHIN THE PROJECT LIMITS OR AS DIRECTED BY THE TOWN AND OR ENGINEER.
35. DO NOT SCALE DRAWINGS UNLESS OTHERWISE NOTED. WRITTEN DIMENSIONS SHALL PREVAIL. REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY.
36. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).THE CONTRACTOR SHALL RESTORE ALL PUBLIC AND PRIVATE PROPERTY TO ITS PRE-CONSTRUCTION CONDITION AT NO ADDITIONAL COST TO THE TOWN.
37. THE CONTRACTOR SHALL RESTORE ALL PUBLIC AND PRIVATE PROPERTY TO ITS PRE-CONSTRUCTION CONDITION AT NO ADDITIONAL COST TO THE TOWN .
38. IN THOSE INSTANCES WHERE POWER OR TELEPHONE POLE SUPPORT IS REQUIRED, THE CONTRACTOR SHALL PROVIDE A MINIMUM 48-HOUR NOTIFICATION TO THE RESPECTIVE UTILITY COMPANY. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR TEMPORARY BRACING OF UTILITIES.
39. ALL STRUCTURES AND PIPELINES LOCATED ADJACENT TO THE TRENCH EXCAVATION SHALL BE PROTECTED AND FIRMLY SUPPORTED BY THE CONTRACTOR UNTIL THE TRENCH IS BACKFILLED. INJURY TO ANY SUCH STRUCTURE CAUSED BY, OR RESULTING FROM, THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. ALL UTILITIES REQUIRING REPAIR, RELOCATION OR ADJUSTMENT AS A RESULT OF THE PROJECT SHALL BE COORDINATED THROUGH THE RESPECTIVE UTILITY AND THE TOWN AND OR ENGINEER.
40. THE CONTRACTOR IS TO TAKE SPECIAL CARE NOT TO DAMAGE EXISTING VEGETATION, TREES, BUSHES, PLANTS, FLOWERS, STONEWALLS, FENCES, MAILBOXES, SIGNS, WALLS WITHIN THE CONSTRUCTION AREA UNLESS THEY ARE NOTED TO BE REMOVED. CONTRACTOR SHALL REPLACE AT NO COST TO OWNER, ALL DAMAGED ITEMS.
41. CONTRACTOR SHALL REMOVE AND REPLACE, OR REPAIR, ALL CURBS, SIDEWALKS, PAVEMENT AND OTHER ITEMS DAMAGED BY HIS CONSTRUCTION ACTIVITIES TO AT LEAST THEIR ORIGINAL CONDITION, AND TO THE SATISFACTION OF THE TOWN AND OR ENGINEER.
42. ANY TRAFFIC SIGNAL EQUIPMENT (LIGHTS, CONDUITS, LOOP DETECTORS) DISTURBED SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AS DIRECTED BY THE TOWN AND OR ENGINEER AT THE CONTRACTOR'S EXPENSE.
43. THE CONTRACTOR SHALL INSTALL AND MAINTAIN TRAFFIC CONTROL DEVICES AS NECESSARY AND IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
44. THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A TELEPHONE NUMBER WHERE THE CONTRACTOR CAN BE REACHED 24 HOURS A DAY, 7 DAYS A WEEK.
45. THE LOCATION AND LIMITS OF ALL ON-SITE WORK AND STORAGE AREAS SHALL BE REVIEWED COORDINATED WITH, AND ACCEPTABLE TO THE TOWN AND OR ENGINEER. THE CONTRACTOR SHALL LIMIT ACTIVITIES TO THESE AREAS.
46. THE CONTRACTOR SHALL BE REQUIRED TO TEMPORARILY PAVE ALL DISTURBED TRAVEL WAYS, SIDEWALKS & DRIVEWAYS NOT UNDER CONSTRUCION OR IF LEFT DURING NON WORKING HOURS AND AS REQUIRED BY THE TOWN AND OR ENGINEER.
47. ALL WORK TO COMPLETE THIS PROJECT AS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

STORMWATER FACILITY OPERATION & MAINTENANCE:

THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSPECTION AND MAINTENANCE OF ALL STORMWATER MANAGEMENT FACILITIES AS OUTLINED BELOW UNTIL SUCH TIME THAT THE ROADWAYS AND ASSOCIATED UTILITIES ARE ACCEPTED BY THE OWNER AND THE ENGINEER.

1. INSPECT AND RESTORE/CLEAN ALL FACILITIES (INLETS, MANHOLES, INFILTRATION BASINS, ETC.) OF SEDIMENT AND DEBRIS PRIOR TO THE OWNER'S ACCEPTANCE.
2. REMOVE AND DISPOSE ALL SEDIMENT AND DEBRIS AT A PRE-APPROVED LOCATION AS APPROVED BY THE TOWN AND OR ENGINEER.
3. REFER TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) FOR ADDITIONAL INFORMATION PERTAINING TO STORMWATER FACILITY OPERATION AND MAINTENANCE REQUIREMENTS. MAINTAIN A WORKING COPY OF THE SWPPP ON SITE AT ALL TIMES.
4. INSPECT AFTER EVERY MAJOR RAINFALL EVENT FOR THE ENTIRE DURATION OF THE CONSTRUCTION PROJECT AND THE FIRST 3 MONTHS AFTER CONSTRUCTION TO ENSURE PROPER STABILIZATION AND CONSTRUCTION.
5. MAINTENANCE REQUIRED FOR DRAINAGE STRUCTURES (INLETS, MANHOLES & CATCH BASINS): ALL DRAINAGE STRUCTURES WILL BE INSPECTED BY THE CONTRACTOR TO MONITOR FOR PROPER OPERATION, COLLECTION OF LITTER OR TRASH, AND STRUCTURAL DETERIORATION. THE BASINS WILL BE CLEANED OF SEDIMENT (INCLUDING SUMPS) AS NECESSARY, AND REPAIRED WHEN REQUIRED.

EROSION & SEDIMENT CONTROL (ESC) NOTES:

1. THE CONTRACTOR SHALL DESIGNATE ON-SITE PERSONNEL RESPONSIBLE FOR THE DAILY INSPECTION AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS AND IMPLEMENTATION OF ALL NECESSARY MEASURES TO CONTROL EROSION AND PREVENT SEDIMENT FROM LEAVING THE SITE.
2. INSTALL ALL EROSION AND SEDIMENT CONTROL (ESC) MEASURES AS INDICATED ON DRAWINGS IN CONSULTATION WITH THE ENGINEER BEFORE ANY CONSTRUCTION ACTIVITIES BEGIN. INSPECT, MAINTAIN, REPAIR AND REPLACE EROSION CONTROL MEASURES, AS NECESSARY, DURING THE ENTIRE CONSTRUCTION PERIOD OF THE PROJECT. THE SITE PERIMETER EROSION CONTROLS ARE THE DESIGNATED LIMIT OF WORK. INFORM ALL PERSONNEL WORKING ON THE PROJECT SITE THAT NO CONSTRUCTION ACTIVITY IS TO OCCUR BEYOND THE LIMIT OF WORK AT ANY TIME THROUGHOUT THE CONSTRUCTION PERIOD.
3. KEEP THE LIMIT OF CLEARING, GRADING AND DISTURBANCES TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. PHASE THE SITE WORK IN A MANNER TO MINIMIZE AREAS OF EXPOSED SOIL. IF TREES ARE TO BE CUT, CLEAR AND GRUB ONLY THOSE AREAS WHICH ARE ACTIVELY UNDER CONSTRUCTION. PROPERLY INSTALL THE SEDIMENTATION CONTROLS PRIOR TO BEGINNING ANY LAND CLEARING ACTIVITY AND/OR OTHER CONSTRUCTION RELATED WORK.
4. MONITOR LOCAL WEATHER REPORTS DURING CONSTRUCTION AND PRIOR TO SCHEDULING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES WHICH LEAVE LARGE DISTURBED AREAS UNSTABILIZED. IF INCLEMENT WEATHER IS PREDICTED, USE BEST PROFESSIONAL JUDGEMENT AND GOOD CONSTRUCTION PRACTICES WHEN SCHEDULING CONSTRUCTION ACTIVITIES AND ENSURE THE NECESSARY EROSION CONTROL DEVICES ARE INSTALLED AND FUNCTIONING PROPERLY TO MINIMIZE EROSION FROM ANY IMPENDING WEATHER EVENTS.
5. INSPECT EROSION AND SEDIMENT CONTROL DEVICES AND STABILIZED SLOPES ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT OF .25 INCH OR GREATER. REPAIR IDENTIFIED PROBLEMS WITHIN 24 HOURS TO ENSURE EROSION AND SEDIMENT CONTROLS ARE IN GOOD WORKING ORDER. RESET OR REPLACE MATERIALS AS REQUIRED.
6. SURROUND THE PERIMETER OF SOIL STOCKPILES WITH SILT SOCK, SILT FENCE, STRAWBALES, OR A COMBINATION OF SILT FENCE WITH STRAWBALE, AS DETERMINED NECESSARY.
7. DISTURBED AREAS AND SLOPES MUST NOT BE LEFT UNATTENDED OR EXPOSED FOR EXCESSIVE PERIODS OF TIME SUCH AS THE INACTIVE WINTER SEASON. PROVIDE APPROPRIATE STABILIZATION PRACTICES ON ALL DISTURBED AREAS AS SOON AS POSSIBLE BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY OR PERMANENTLY CEASED, REINFORCE TEMPORARY AREAS HAVING A SLOPE GREATER THAN 4:1 WITH EROSION BLANKETS OR APPROVED EQUAL UNTIL THE SITE IS PROPERLY STABILIZED. TEMPORARY SWALES MAY ALSO BE REQUIRED IF DETERMINED NECESSARY IN THE FIELD BY THE ENGINEER.
8. INSTALL A CATCH BASIN SILT SACK OR APPROVED EQUIVALENT IN EACH EXISTING CATCH BASIN RECEIVING RUNOFF FROM THE SITE. UPON THE INSTALLATION OF EACH CATCH BASIN, INSTALL SILT SACK OR APPROVED EQUIVALENT. INSPECT SILT SACKS, AFTER EACH SIGNIFICANT STORM EVENT AND REMOVE AND EMPTY AS NEEDED FOR THE DURATION OF THE CONSTRUCTION PERIOD.
9. SMALL SEDIMENTATION BASINS MAY BE CONSTRUCTED ON AN AS-NEEDED BASIS DURING CONSTRUCTION TO AID IN THE CAPTURE OF SITE RUNOFF AND SEDIMENT. IT WILL BE THE RESPONSIBILITY OF THE SITE CONTRACTOR, IN CONSULTATION WITH THE ENGINEER, TO SIZE AND CREATE THESE BASINS IN APPROPRIATE LOCATIONS.
10. CONTAIN ALL SEDIMENT ON SITE. SWEEP ALL EXITS FROM THE SITE AS NECESSARY INCLUDING ANY SEDIMENT TRACKING. SWEEP PAVED AREAS AS NEEDED TO REMOVE SEDIMENT AND POTENTIAL POLLUTANTS ACCUMULATED DURING SITE CONSTRUCTION.
11. REMOVE ACCUMULATED SEDIMENT FROM ALL TEMPORARY PRACTICES AND DISPOSE OF IN A PRE-APPROVED LOCATION.
12. TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER, PROVIDE ON SITE,OR MAKE READILY AVAILABLE, THE NECESSARY EQUIPMENT AND SITE PERSONNEL DURING CONSTRUCTION HOURS FOR THE DURATION OF THE PROJECT. IF SITE WORK IS SUSPENDED DURING THE WINTER MONTHS THE CONTRACTOR MUST CONTINUE TO PROVIDE PERSONNEL AND EQUIPMENT ON SITE OR READILY AVAILABLE .
13. CONTROL DUST BY WATERING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER.

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Proposal No. 608744-13412
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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	005	288
PROJECT FILE NO.	608744		

BORING LOGS - 01

ENVIRONMENTAL • GEOTECHNICAL
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Sample Description

Sample No.	Description	Source
1a	Sand	Core Test Hole #1 14 1/2"-24"
2a	Sand	Core Test Hole #2 12"-24"
3a	Sand	Core Test Hole #3 5 3/8"-24"
4a	Sandy Gravel	Core Test Hole #4 4"-6"
4b	Sand	Core Test Hole #4 6"-24"
5a	Sandy Gravel	Core Test Hole #5 4 7/8"-24"
6a	Sand with Some Gravel	Core Test Hole #6 5"-24"
7a	Silty Sand	Core Test Hole #7 5 1/4"-12"
7b	Sand	Core Test Hole #7 12"-24"
8a	Silty Sand with Gravel	Core Test Hole #8 15"-24"
9a	Sand	Core Test Hole #9 15"-24"
10a	Silty Sand with Gravel	Core Test Hole #10 3 1/2"-19"
12a	Sand	Core Test Hole #12 5 1/4"-24"

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Page 3

Washed Sieve Analysis
(% passing by weight)

Sieve Size (mm)	1a	2a	3a	4a	4b
4" (100.0)					
3 (75.0)					
2 (50.0)					
1 1/2 (37.5)		100		100	
1 (25.0)	100	99		97	
3/4 (19.0)	99	98	100	96	100
1/2 (12.5)	97	97	99	85	99
3/8 (9.5)	96	96	98	78	98
#4 (4.75)	95	95	97	63	97
10 (2.00)	94	94	96	49	93
20 (.850)	82	82	87	28	83
40 (.425)	27	29	22	13	24
50 (.300)	21	21	16	10	18
80 (.180)	15	15	13	8	14
200 (.075)	7.7	7.4	6.9	3.9	7.0

Sieve Size (mm)	5a	6a	7a	7b	8a
3" (75.0)					
2 (50.0)					
1 1/2 (37.5)	100	100			
1 (25.0)	99	99			100
3/4 (19.0)	98	98			97
1/2 (12.5)	91	96	100	100	94
3/8 (9.5)	86	94	99	99	92
#4 (4.75)	69	90	98	98	90
10 (2.00)	56	86	96	97	87
20 (.850)	44	72	80	95	80
40 (.425)	16	16	54	82	52
50 (.300)	12	11	47	13	45
80 (.180)	7	6	36	7	34
200 (.075)	3.7	3.4	12.8	4.8	19.5

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Page 4

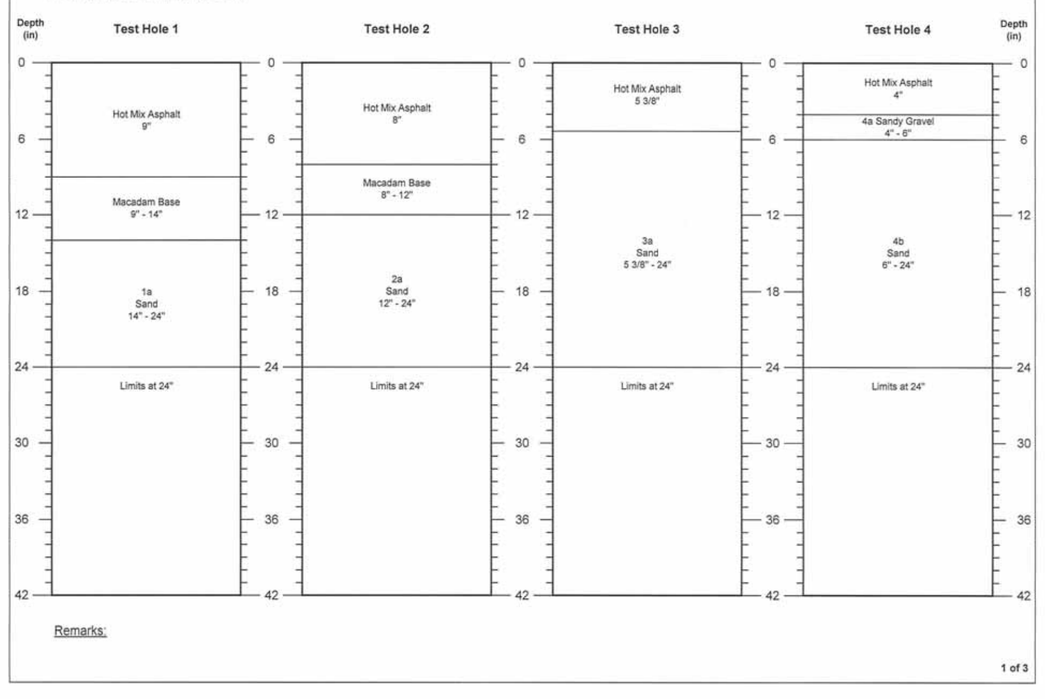
Sieve Size (mm)	9a	10a	12a
3" (75.0)		100	
2 (50.0)		97	
1 1/2 (37.5)		97	
1 (25.0)	100	92	
3/4 (19.0)	99	85	100
1/2 (12.5)	98	72	99
3/8 (9.5)	97	66	99
#4 (4.75)	96	59	98
10 (2.00)	95	49	97
20 (.850)	81	40	81
40 (.425)	26	31	16
50 (.300)	21	27	13
80 (.180)	16	22	10
200 (.075)	8.2	16.1	5.3

Laboratory CBR Test Results

	3a	10a
Maximum Dry Density (pcf)	119.8	134.7
Optimum Moisture (%)	8.6	7.1
Dry Density before Soaking (pcf)	118.9	133.9
Moisture Content before Soaking (%)	8.4	6.5
Dry Density after Soaking (pcf)	119.2	134.2
Moisture Content after Soaking (%)	9.4	7.6
Swell (%)	0.0	0.0
CBR @ 0.1"	16	39
CBR @ 0.2"	34	36

ENVIRONMENTAL • GEOTECHNICAL
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40 Strafello Drive, Unit G, Avon, MA 02322
Phone: (508) 588-0886 Fax: (508) 588-2414

PROJECT: Shank Painter Rd. & Route 6 Provincetown, MA
DATE: January 9, 2019
CLIENT: Environmental Partners
ATC PROJECT No 25.31414.003-1
WEATHER: 40's
ATC INSPECTOR: Florencio & Sheldon
LOG PREPARED BY: A. Rodrigues

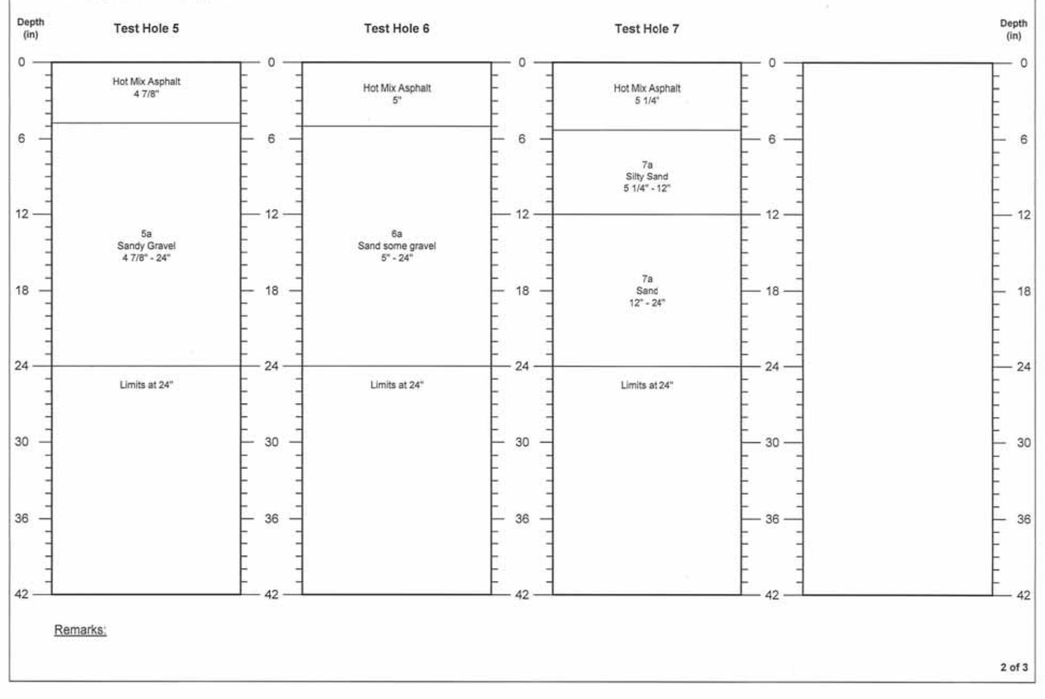


Remarks:

1 of 3

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DATE: January 9, 2019
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LOG PREPARED BY: A. Rodrigues

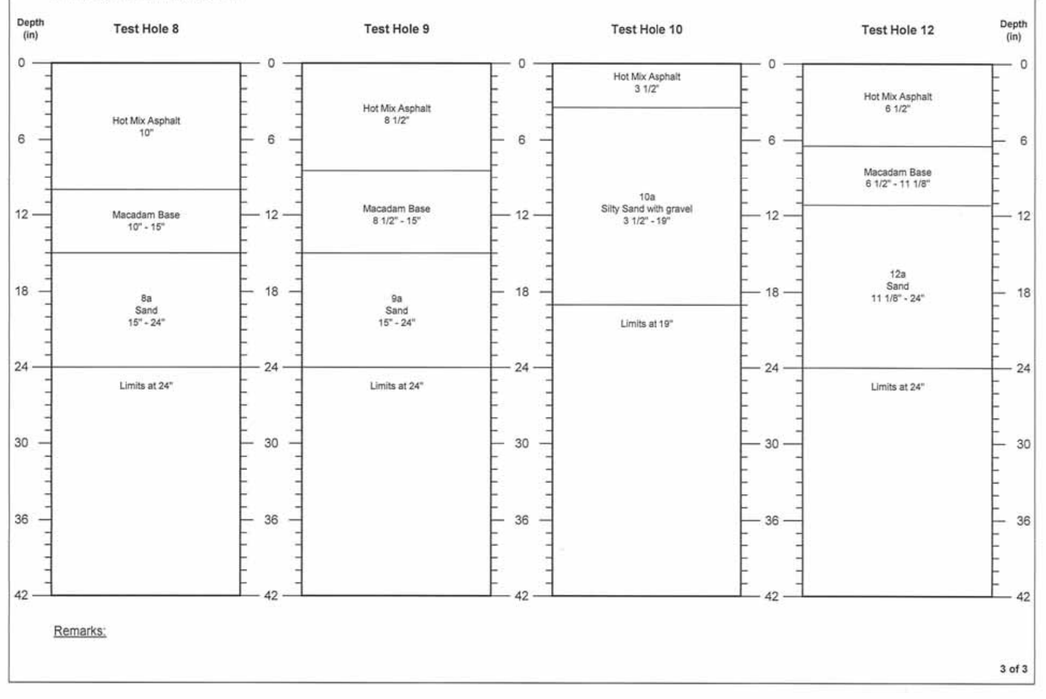


Remarks:

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ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING
40 Strafello Drive, Unit G, Avon, MA 02322
Phone: (508) 588-0886 Fax: (508) 588-2414

PROJECT: Shank Painter Rd. & Route 6 Provincetown, MA
DATE: January 15, 2019
CLIENT: Environmental Partners
ATC PROJECT No 25.31414.003-1
WEATHER: 40's
ATC INSPECTOR: Florencio & Pina
LOG PREPARED BY: A. Rodrigues



Remarks:

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608744_HD(GENERAL_NOTES).DWG Plotted on 14-Apr-2025 4:26 PM
Proposal No. 608744-136412
A008869 - 156

BORING LOG

Project; Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 79F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-1
Location: Gravel Lot near #15 SP Rd.
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 5.13' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					1
2						
3						
4					Wood	
5	S-1	9 7 3 5	24/7	3" Wood 4" Coarse Sand with Trace Gravel	Coarse Sand with Trace Gravel	2
6						
7						
8						
9					Coarse Sand	
10	S-2	6 5 3 3	24/24	18" Coarse Sand 3" Wood 3" Medium Gravel and Sand	Wood Medium Gravel and Sand	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:
1. Wood from around 1.5'-3' below grade.
2. Approximate GW elev. = 5.13' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 2(to 35%
Little - Approximately 10 to 20%.	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - fkedium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project; Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 80F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-2
Location: Parking Lot Near Fire Station
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 6.25' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4					Sand with Some Med. Gravel	
5	S-1	6 5 7 7	24/17	5" Sand with Some Medium Gravel 12" Coarse Sand	Coarse Sand	1
6						
7						
8						
9						
10	S-2	5 5 5 4	24/21	21" Coarse Sand with Trace Gravel	Coarse Sand with Trace Gravel	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:
1. Approximate GW elev. = 6.25' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 2(to 35%
Little - Approximately 10 to 20%.	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - fkedium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project; Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-3
Location: SP Rd and Court St Intersection
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 10.2' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4					Asphalt/Pavement	
5	S-1	10 4 10 18	24/17	2" Asphalt/Pavement 15" Coarse Sand	Coarse Sand	
6						
7						
8						
9					Coarse Sand with Little Gravel	
10	S-2	18 9 9 7	24/21	2" Coarse Sand with Little Gravel 19" Coarse Sand	Coarse Sand	1
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:
1. Approximate GW elev. = 10.2' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 2(to 35%
Little - Approximately 10 to 20%.	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - fkedium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project; Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-4
Location: SP Rd and Court St Intersection
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 10.7' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4						
5	S-1	5 2 7 14	24/19	19" Coarse Sand	Coarse Sand	
6						
7						
8						
9					Sand with Some Med. Gravel	
10	S-2	6 7 10 12	24/20	2" Sand with Some Medium Gravel 18" Coarse Sand	Coarse Sand	1
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:
1. Approximate GW elev. = 10.7' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 2(to 35%
Little - Approximately 10 to 20%.	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - fkedium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project; Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-5
Location: SP Rd and Rt. 6 Interseciton
Approx. Ground Elev: 16' bgs
Approx. Groundwater Elev: 11.7' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4						
5	S-1	7 10 11 13	24/21	5" Coarse Sand with Trace Silt 16" Coarse Sand	Coarse Sand with Trace Silt Coarse Sand	
6						
7						
8						
9						
10	S-2	6 10 11 9	24/21	21" Coarse Sand	Coarse Sand	
11						1
12						
13						
14						
15	S-3	8 35 47 90+	24/24	23" Coarse Sand 1" Rock	Coarse Sand Rock	2
16						
17						
18						
19						
20						
21						

NOTES:
1. Approximate GW elev. = 11.7' below grade.
2. Approximate Bedrock elev. = 16' below grade.

LEGEND

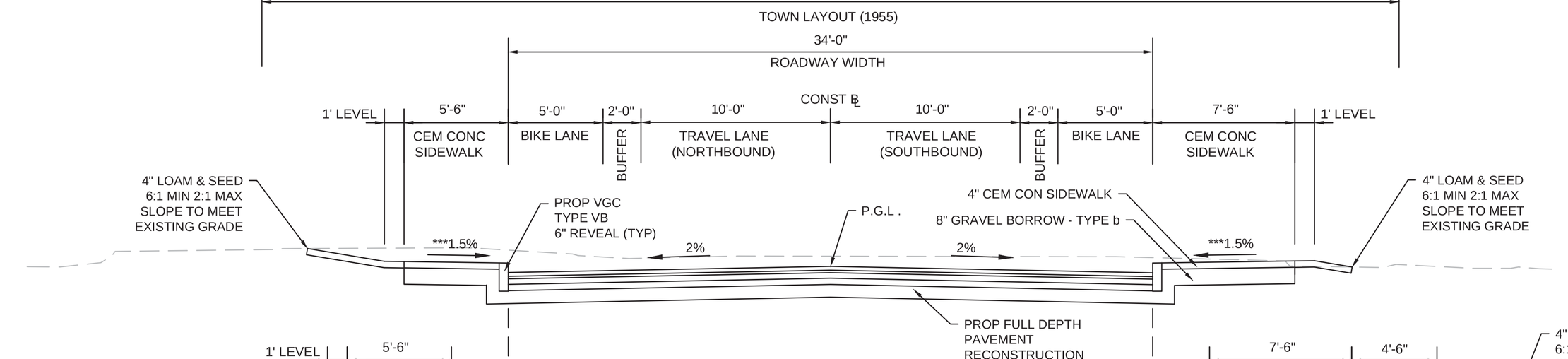
S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 2(to 35%
Little - Approximately 10 to 20%.	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - fkedium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

608744_HD(GENERAL_NOTES).DWG Plotted on 14-Apr-2025 4:27 PM
Proposal No. 608744-136412
AM0860 - 157

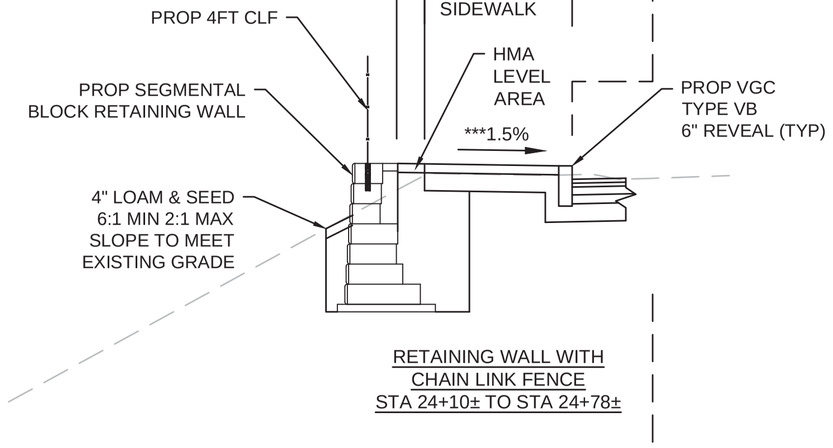
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	007	288
PROJECT FILE NO.	608744		

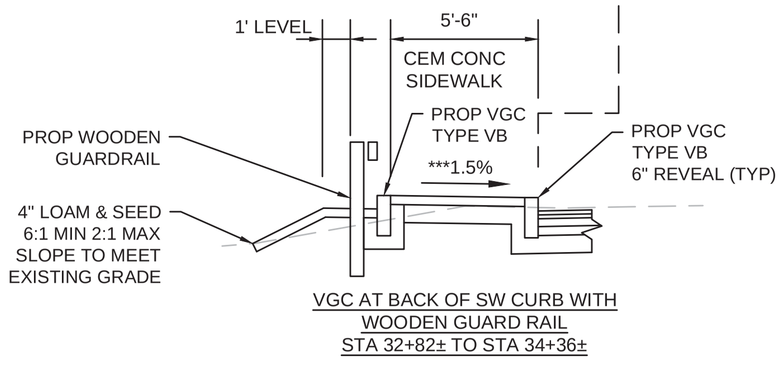
TYPICAL SECTIONS - 01



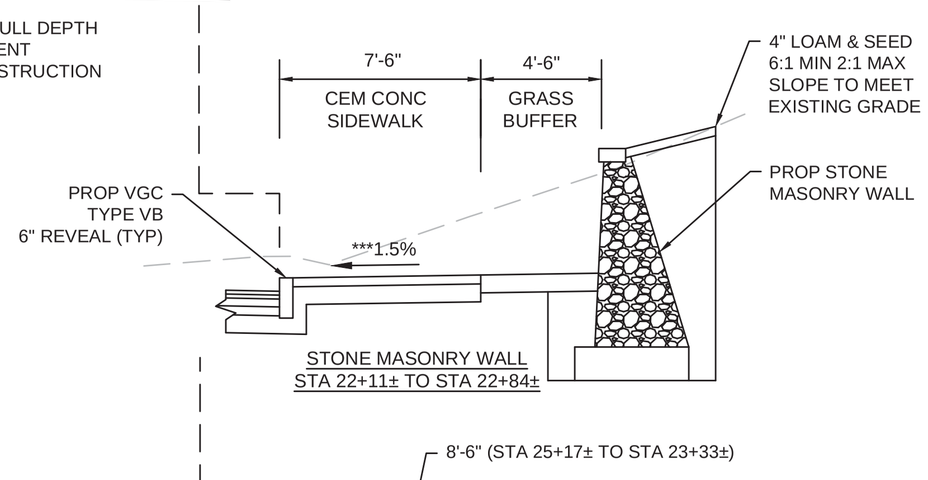
SHANK PAINTER ROAD
STA 12+65± TO STA 37+40±



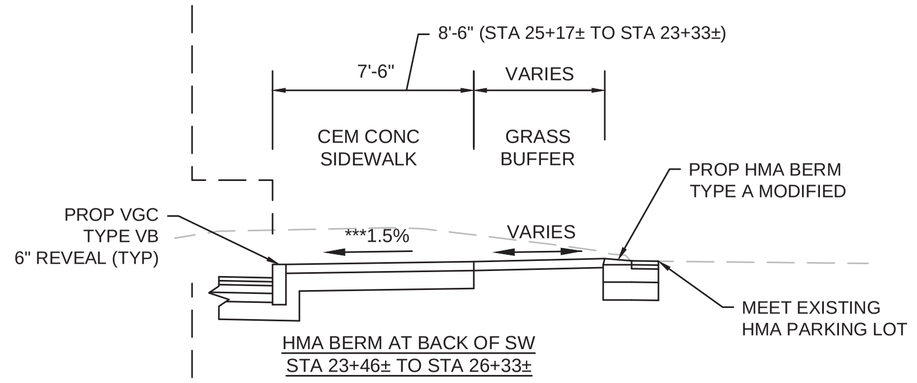
RETAINING WALL WITH CHAIN LINK FENCE
STA 24+10± TO STA 24+78±



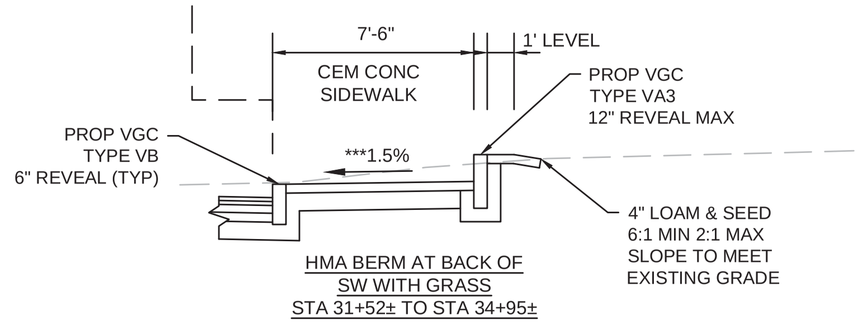
VGC AT BACK OF SW CURB WITH WOODEN GUARD RAIL
STA 32+82± TO STA 34+36±



STONE MASONRY WALL
STA 22+11± TO STA 22+84±



HMA BERM AT BACK OF SW
STA 23+46± TO STA 26+33±



HMA BERM AT BACK OF SW WITH GRASS
STA 31+52± TO STA 34+95±

GENERAL NOTES:
1. ALL SAWCUTS INCLUDING THOSE IN DRIVEWAYS SHALL BE SEALED WITH A LIQUID ASPHALT SEALER.

* LEVELING COURSE TO BE PAID FOR UNDER ITEM 460. HOT MIX ASPHALT AT THE DIRECTION OF THE TOWN AND OR ENGINEER

** PROPOSED NEW GRANITE CURB TYPE VB AS DIRECTED BY THE TOWN AND/OR ENGINEER

*** 0.5%± CONSTRUCTION TOLERANCE

PAVEMENT NOTES

PROPOSED PAVEMENT MILLING & OVERLAY

SURFACE: 1.75" SUPERPAVE SURFACE COURSE (SSC 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) @ 0.08 GAL/SY OVER

*LEVELING: VARIABLE DEPTH (1" MAX) OVER

MILLING: VARIABLE DEPTH (0.5" TO 1.75") PAVEMENT MILLING

PROPOSED FULL DEPTH PAVEMENT RECONSTRUCTION / WIDENING GREATER OR EQUAL TO 4 FT

SURFACE: 1.75" SUPERPAVE SURFACE COURSE (SSC 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) @ 0.08 GAL/SY OVER

INTERMEDIATE: 1.75" SUPERPAVE INTERMEDIATE COURSE (SIC 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) @ 0.07 GAL/SY OVER

BASE: 3.5" SUPERPAVE BASE COURSE (SBC 37.5) OVER

SUBBASE: 4" DENSE GRADE CRUSHED STONE OVER 8" GRAVEL BORROW (TYPE b)

PROPOSED FULL DEPTH BOX WIDENING LESS THAN 4FT

SURFACE: 1.75" SUPERPAVE SURFACE COURSE (SSC 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) @ 0.07 GAL/SY OVER

INTERMEDIATE: 1.75" SUPERPAVE INTERMEDIATE COURSE (SIC 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) @ 0.07 GAL/SY OVER

BASE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE OVER

SUBBASE: 8" GRAVEL BORROW (TYPE b)

PROPOSED HOT MIX ASPHALT PAVEMENT MILLING & OVERLAY FOR ROADWAY, PEDESTRIAN AND BIKE LANE

SURFACE: 1.75" SUPERPAVE SURFACE COURSE (SSC 12.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) @ 0.08 GAL/SY OVER

*LEVELING: VARIABLE DEPTH (1" MAX) SUPERPAVE LEVELING COURSE - 12.5 (SLC 12.5) DIRECTED BY THE ENGINEER OVER

MILLING: VARIABLE DEPTH (0.5" TO 1.75") PAVEMENT MILLING

PROPOSED CEMENT CONCRETE DRIVEWAY

SURFACE 6" CEMENT CONCRETE OVER

SUBBASE: 8" GRAVEL BORROW (TYPE b)

PROPOSED CEMENT CONCRETE TRUCK APRON

SURFACE: 8" STAMPED COLORED CONCRETE 4000 PSI, 0.75", 610, AIR-ENTRAINED WITH PENETRANT SEALER OVER

SUBBASE: 8" GRAVEL BORROW (TYPE b)

PROPOSED CEMENT CONCRETE SIDEWALK AND PEDESTRIAN CURB RAMP

SURFACE: 4" CEMENT CONCRETE OVER

SUBBASE: 8" GRAVEL BORROW (TYPE b)

PROPOSED FULL DEPTH HOT MIX ASPHALT DRIVEWAY, BIKE PATH AND BIKE RAMP

SURFACE: 4" HOT MIX ASPHALT PLACE IN TWO LAYERS 1.5" SURFACE COURSE OVER 2.5" INTERMEDIATE COURSE

SUBBASE: 8" GRAVEL BORROW (TYPE b)

PROPOSED LOAM & SEED

SURFACE: VARIABLE DEPTH (4" TO 6") LOAM BORROW

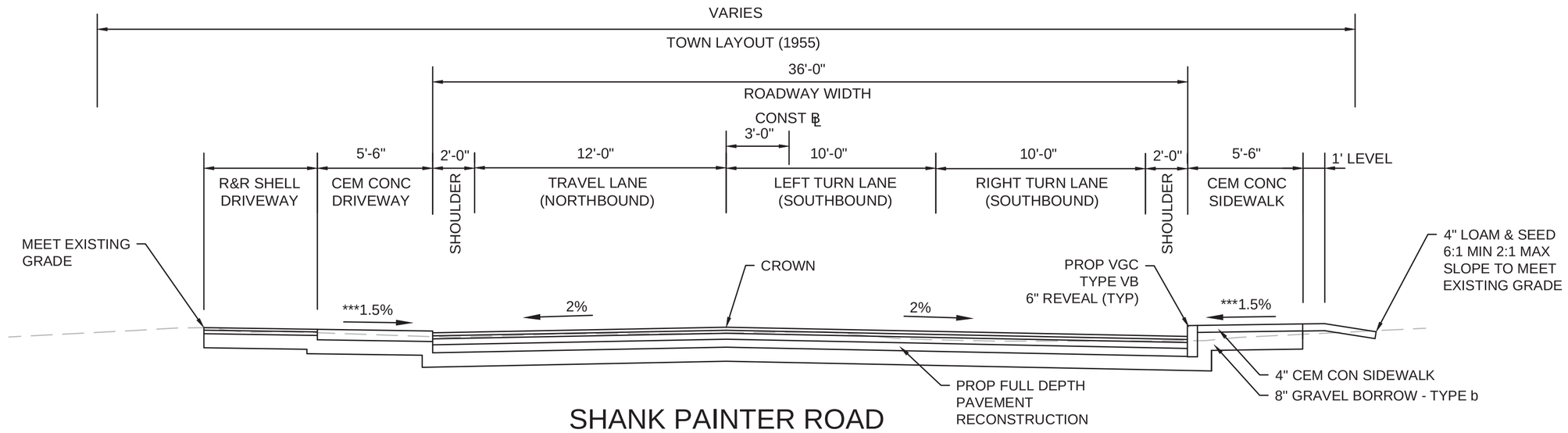
SUBBASE: VARIABLE DEPTH SUITABLE EXCAVATED MATERIAL OR ORDINARY BORROW (AS DIRECTED BY ENGINEER)

608744_HD(TYP).DWG Plotted on 14-Apr-2025 4:27 PM
Proposal No. 608744-136412
A008860 - 158

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

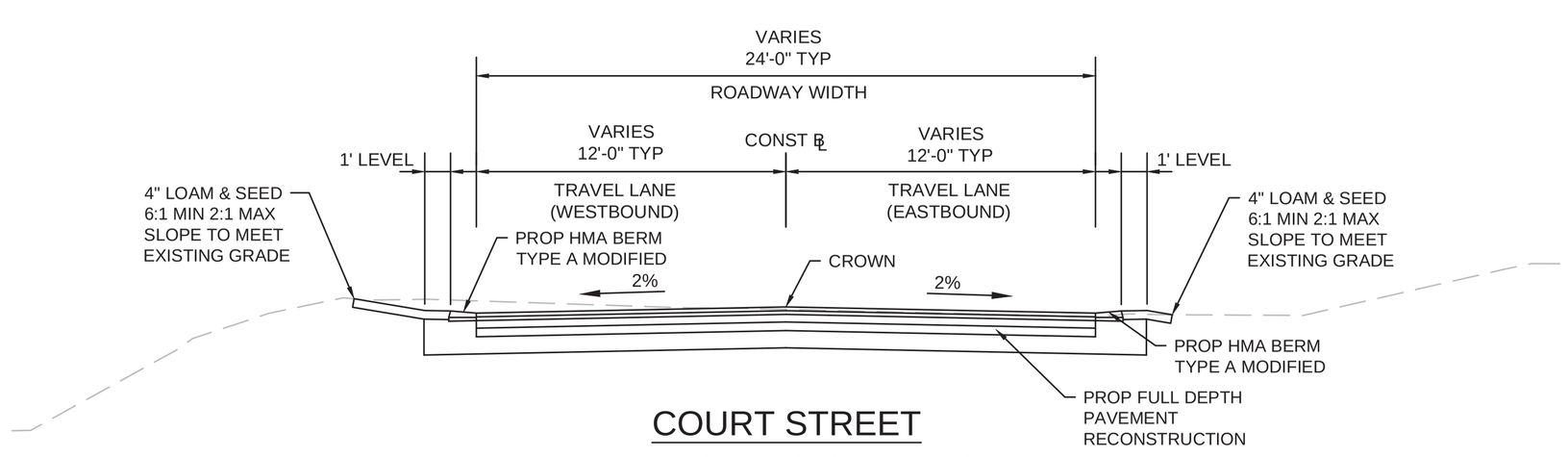
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	008	288
PROJECT FILE NO.		608744	

TYPICAL SECTIONS - 02



SHANK PAINTER ROAD
STA 37+85± TO STA 38+35±

SEE PAVEMENT AND GENERAL NOTES ON SHEET 007



COURT STREET
STA 5+39± TO STA 5+60±

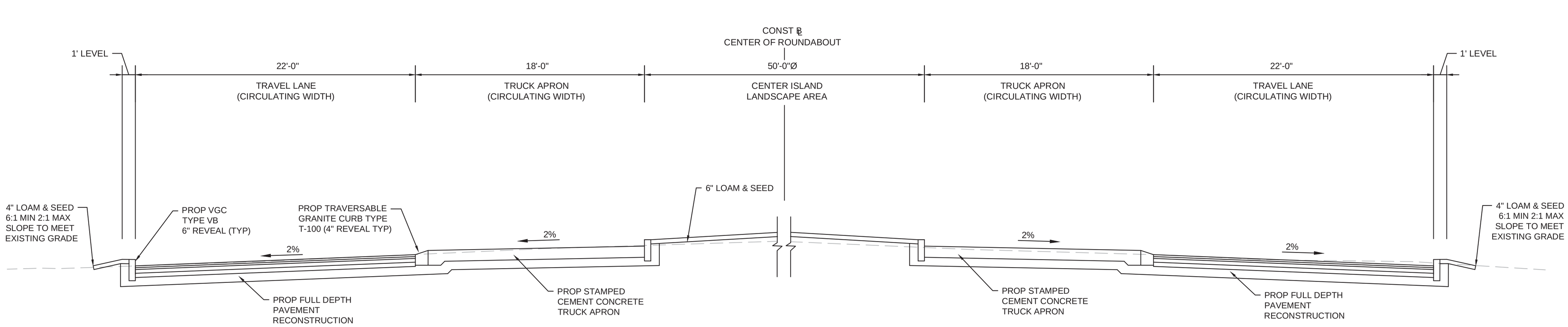
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Proposal No. 608744-13412
A008660 - 159

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	009	288
PROJECT FILE NO.	608744		

TYPICAL SECTIONS - 03

SEE PAVEMENT AND GENERAL NOTES ON SHEET 007



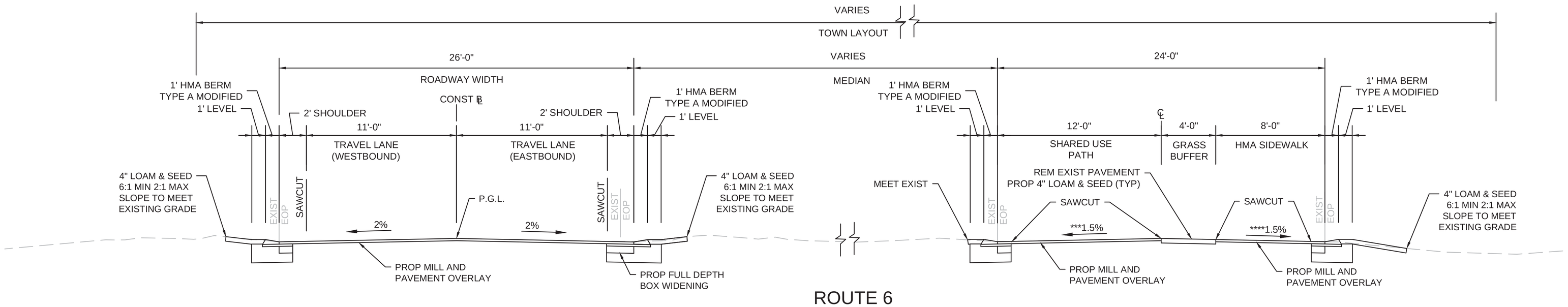
ROUNDABOUT
ROUTE 6 AT SHANK PAINTER ROAD

608744_HDI(TYP).DWG Plotted on 14-Apr-2025 4:27 PM
Proposal No. 608744-136412
A008860 - 160
608744 - 69

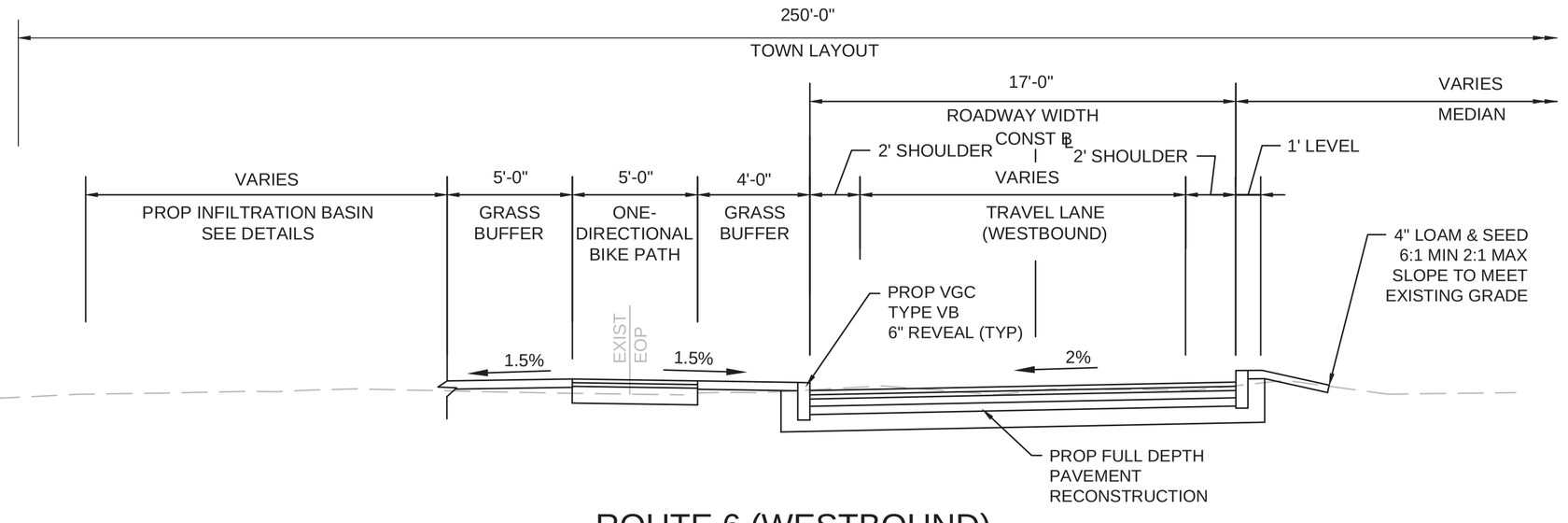
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	010	288
PROJECT FILE NO.	608744		

TYPICAL SECTIONS - 04

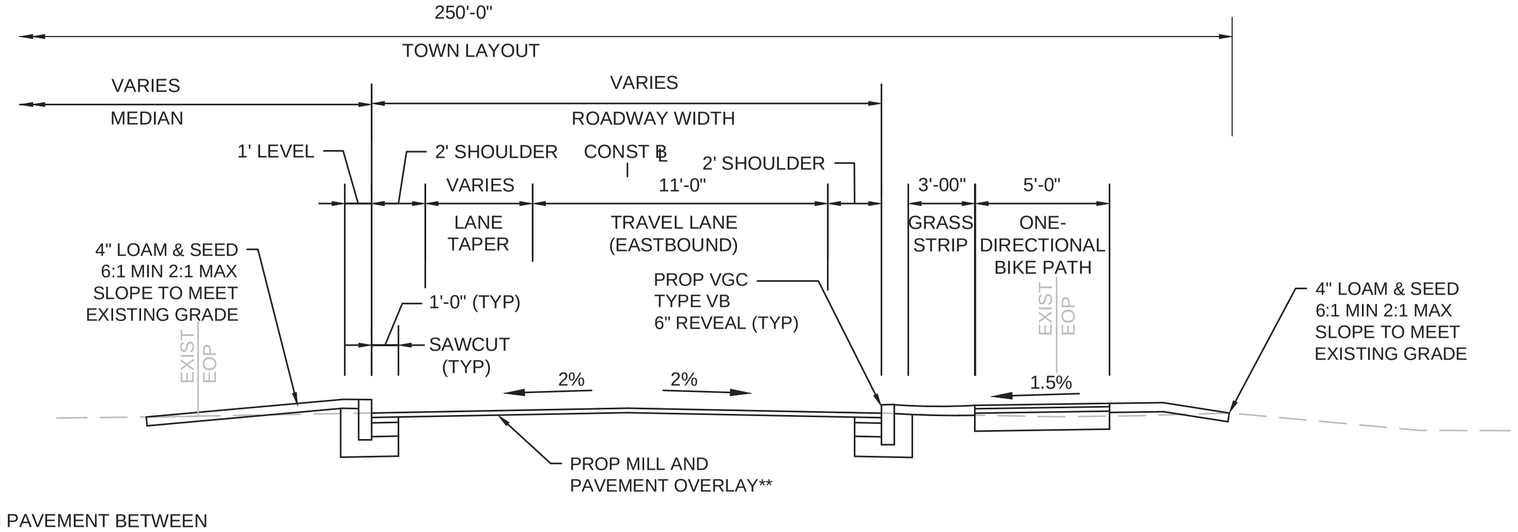


ROUTE 6
STA 62+69± TO STA 109+64±



ROUTE 6 (WESTBOUND)
STA 500+70± TO STA 502+94±

SEE PAVEMENT AND GENERAL NOTES ON SHEET 007



** FULL DEPTH PAVEMENT BETWEEN STA 200+70± TO STA 201+50±

ROUTE 6 (EASTBOUND)
STA 200+70± TO STA 202+90±

608744_HDI(TYP).DWG Plotted on 14-Apr-2025 4:27 PM
Proposal No. 608744-136412
A000690 - 161

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	033	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 04

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

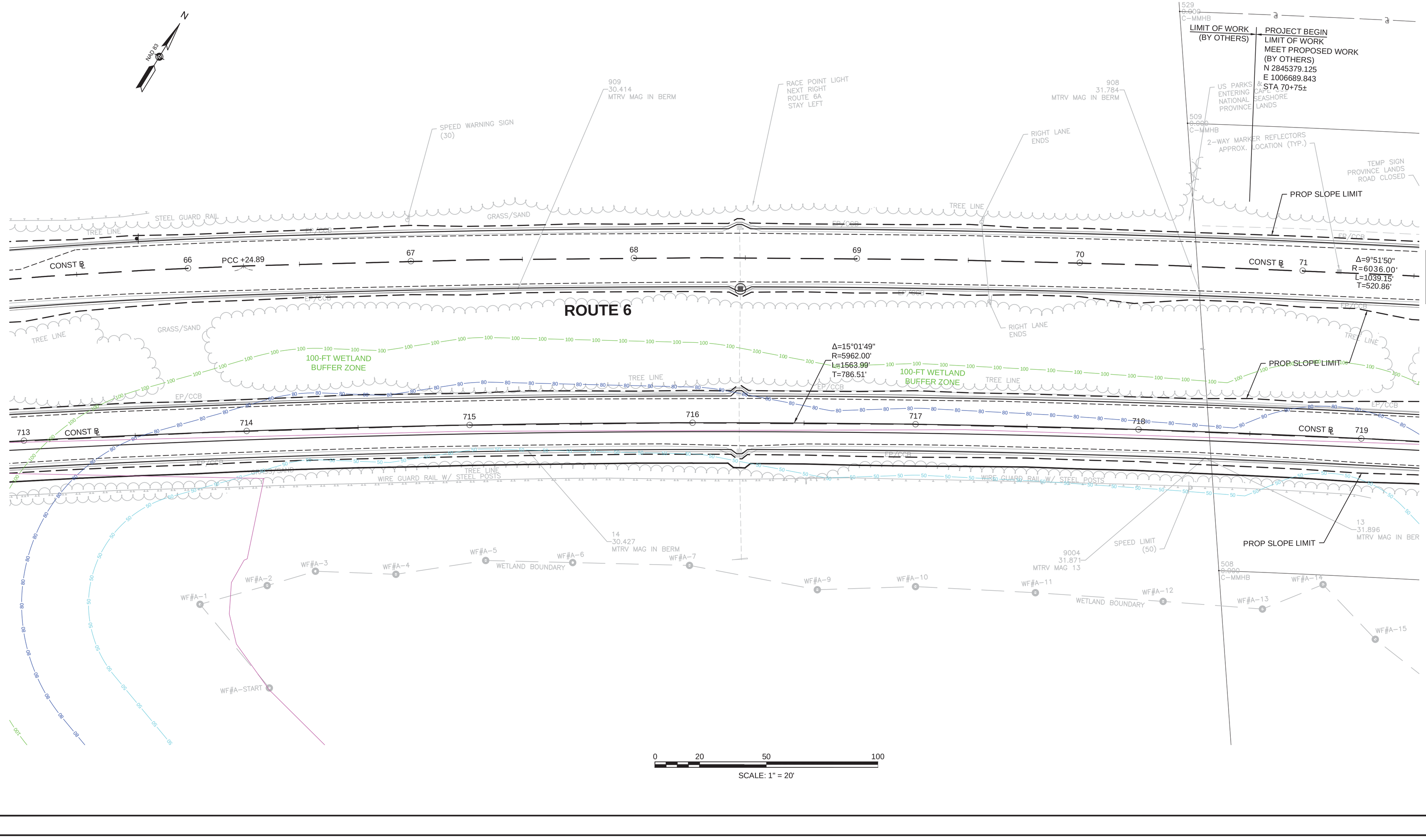
NONE

DRAINAGE DETAILS

SEE SHEET 133

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



608744_HD(CP_RTE6).DWG Plotted on 31-Jul-2025 4:06 PM
Proposal No. 608744-136412

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET 134

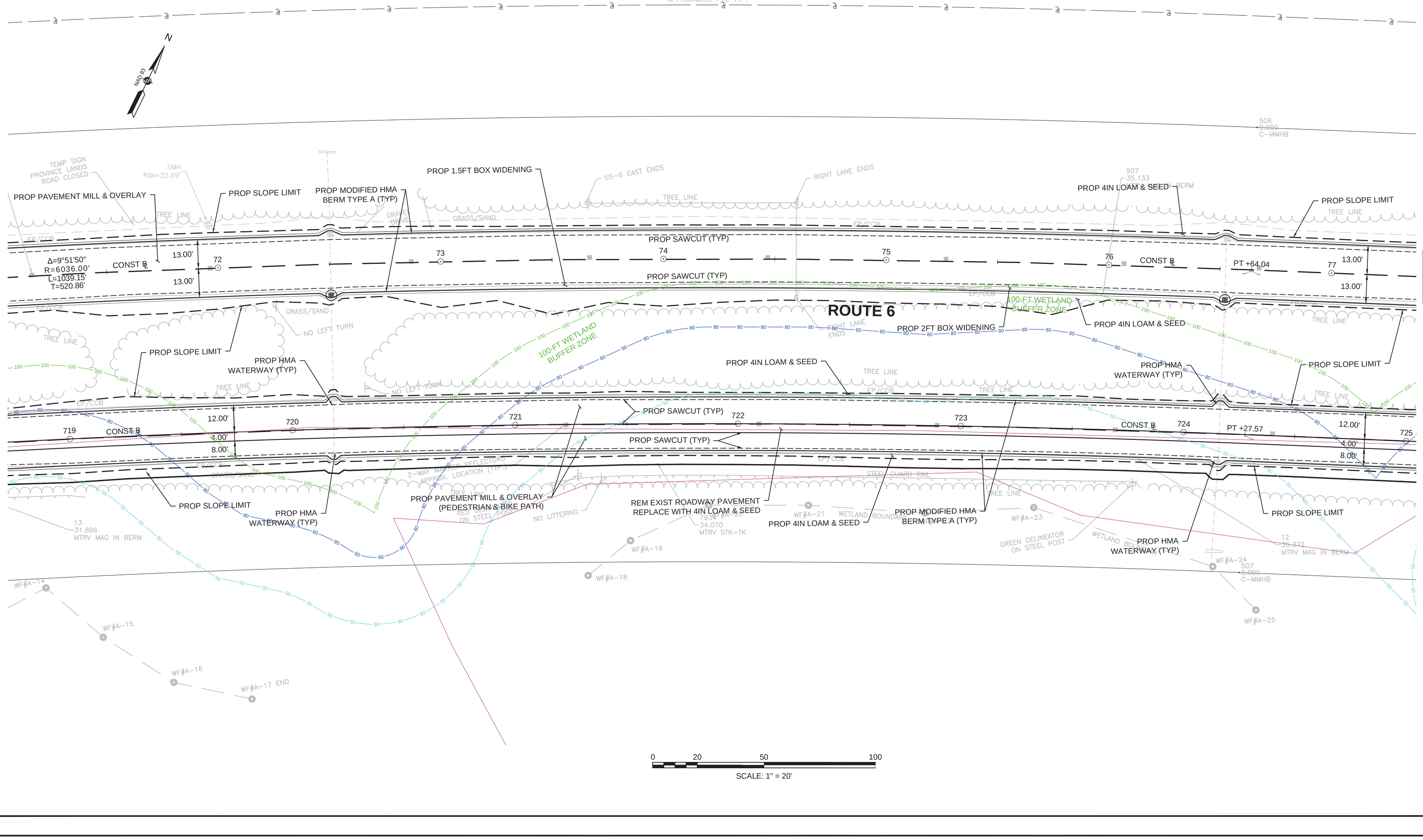
NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	034	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 05



608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:39 AM
Proposal No. 608744-136412
A088069 - 163

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET 135

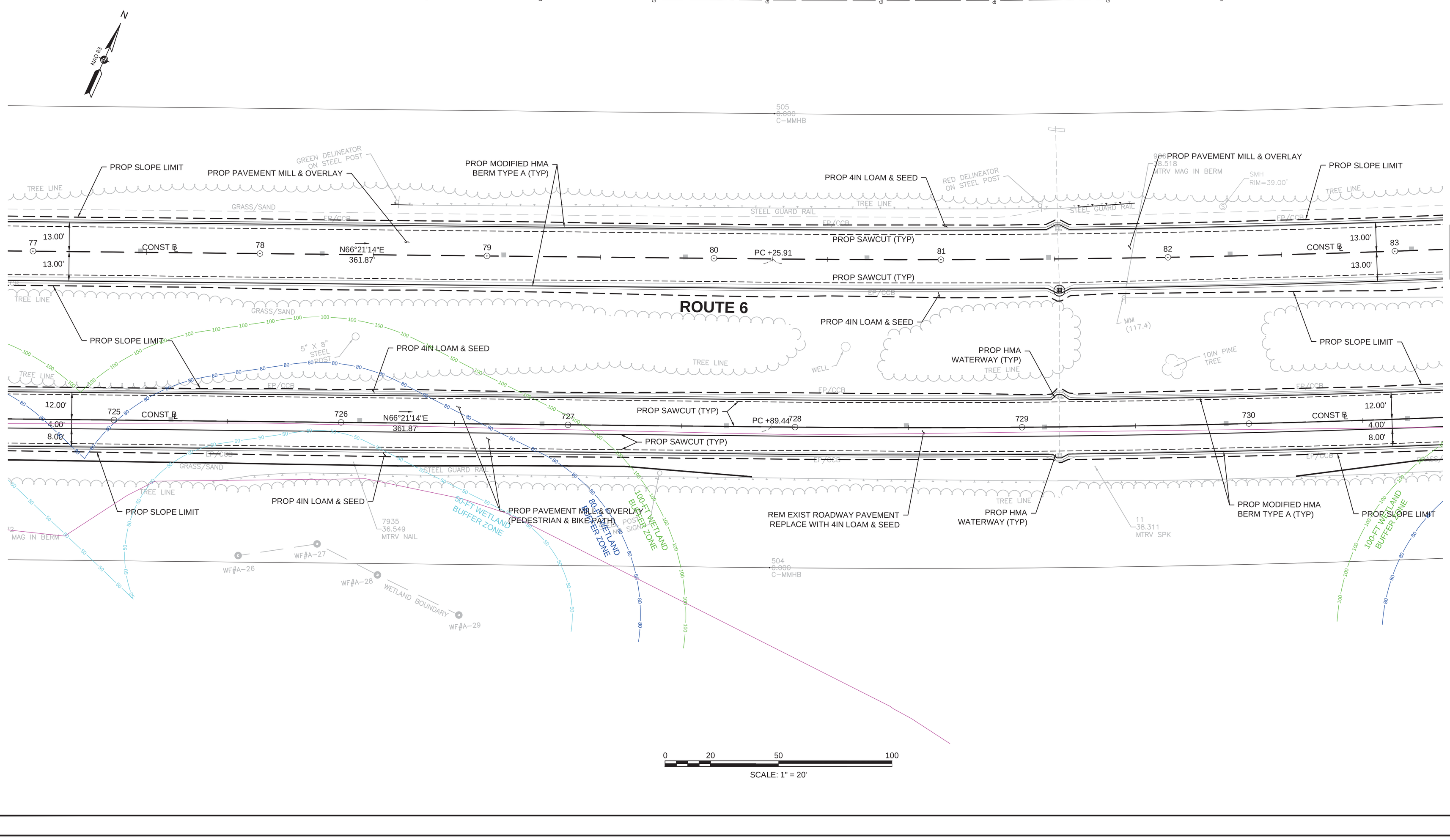
NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	035	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 06



608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:39 AM
Proposal No. 608744-134412
AM8960 - 164

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

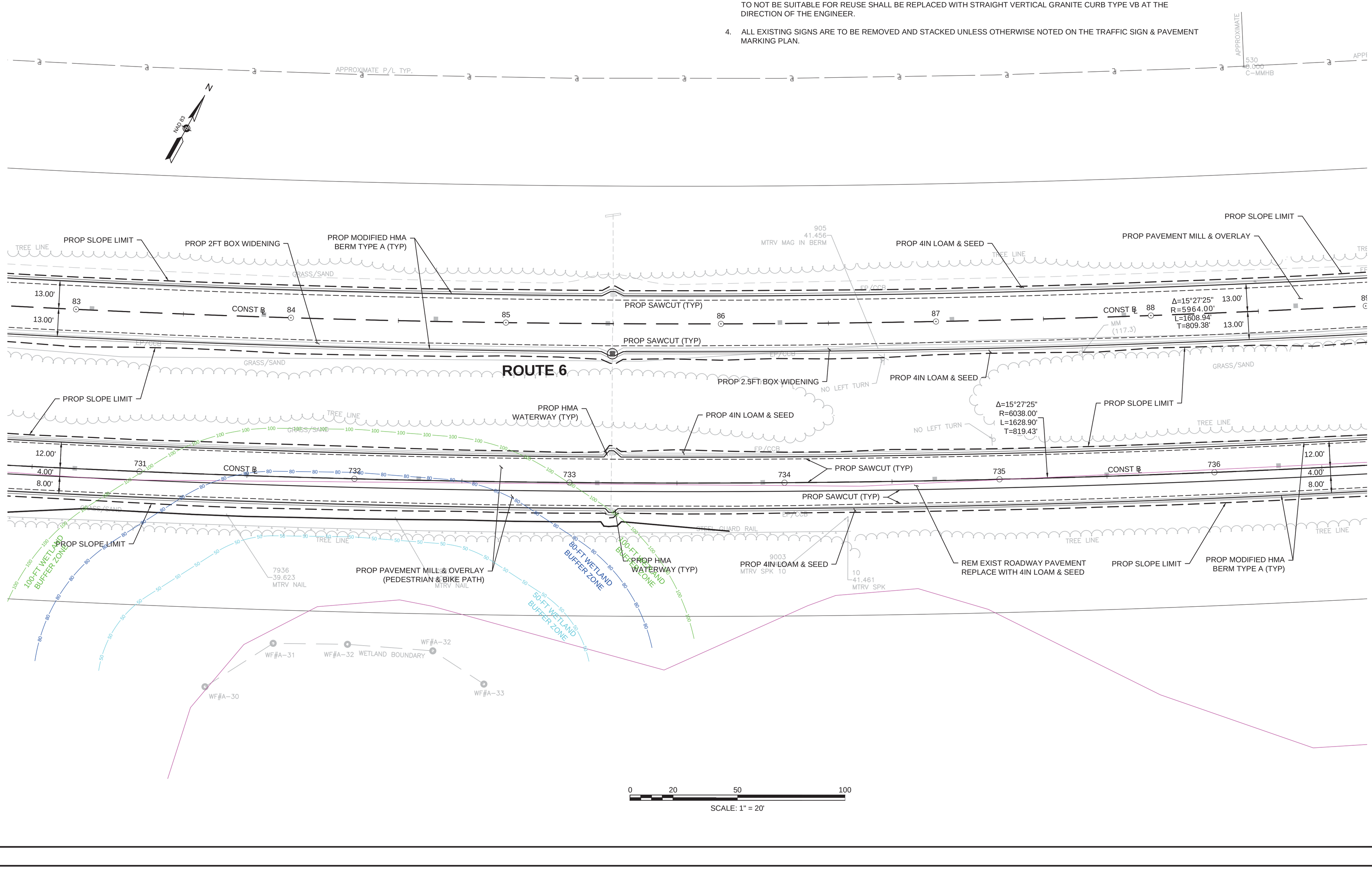
NONE

DRAINAGE DETAILS

SEE SHEET 136

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:39 AM
Proposal No. 608744-136412
AM88069 - 165

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	037	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 08

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

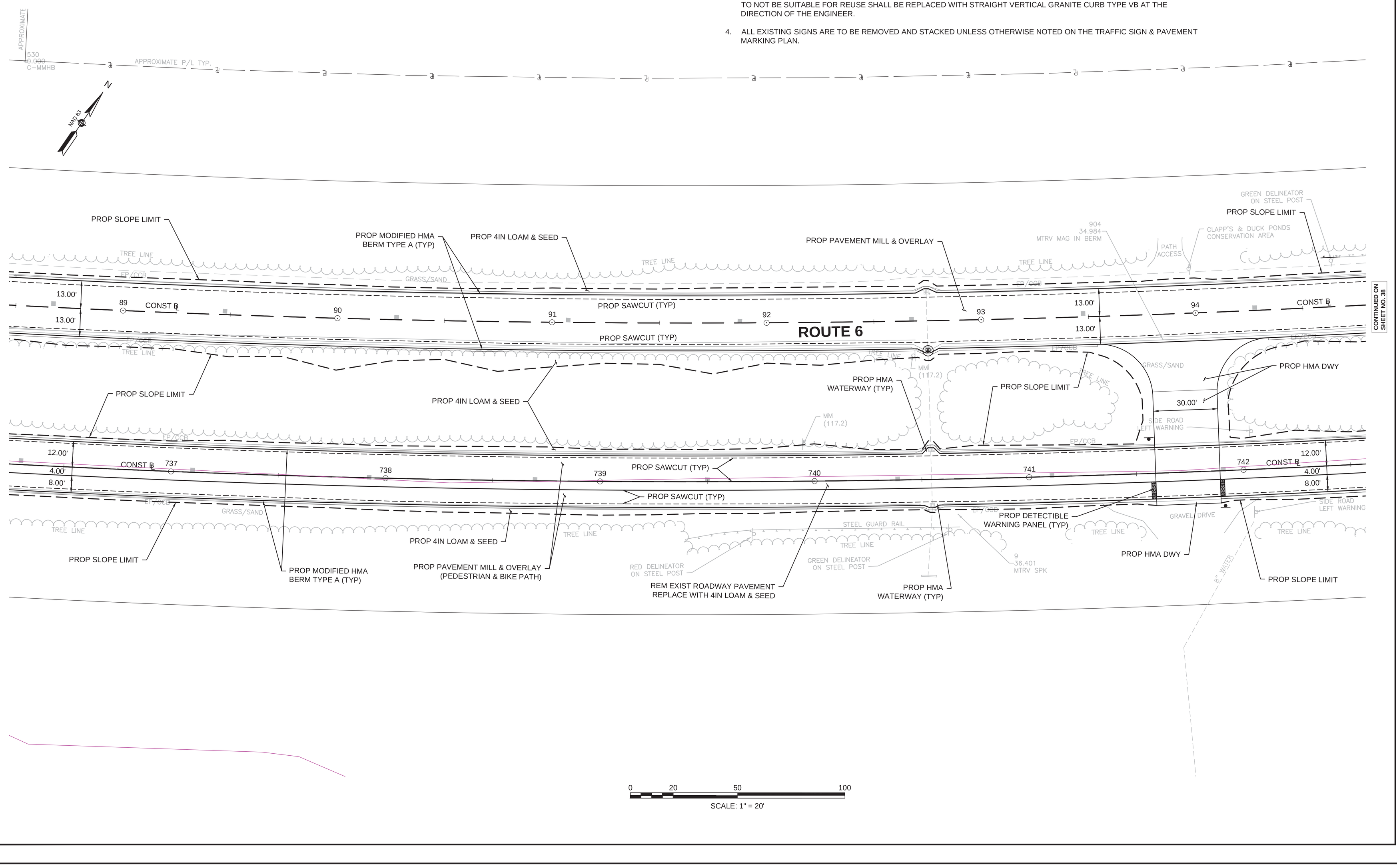
NONE

DRAINAGE DETAILS

SEE SHEET 137

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



0 20 50 100

SCALE: 1" = 20'

608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:40 AM

Proposal No. 608744-136412

AM8869 - 166

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	038	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 09

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

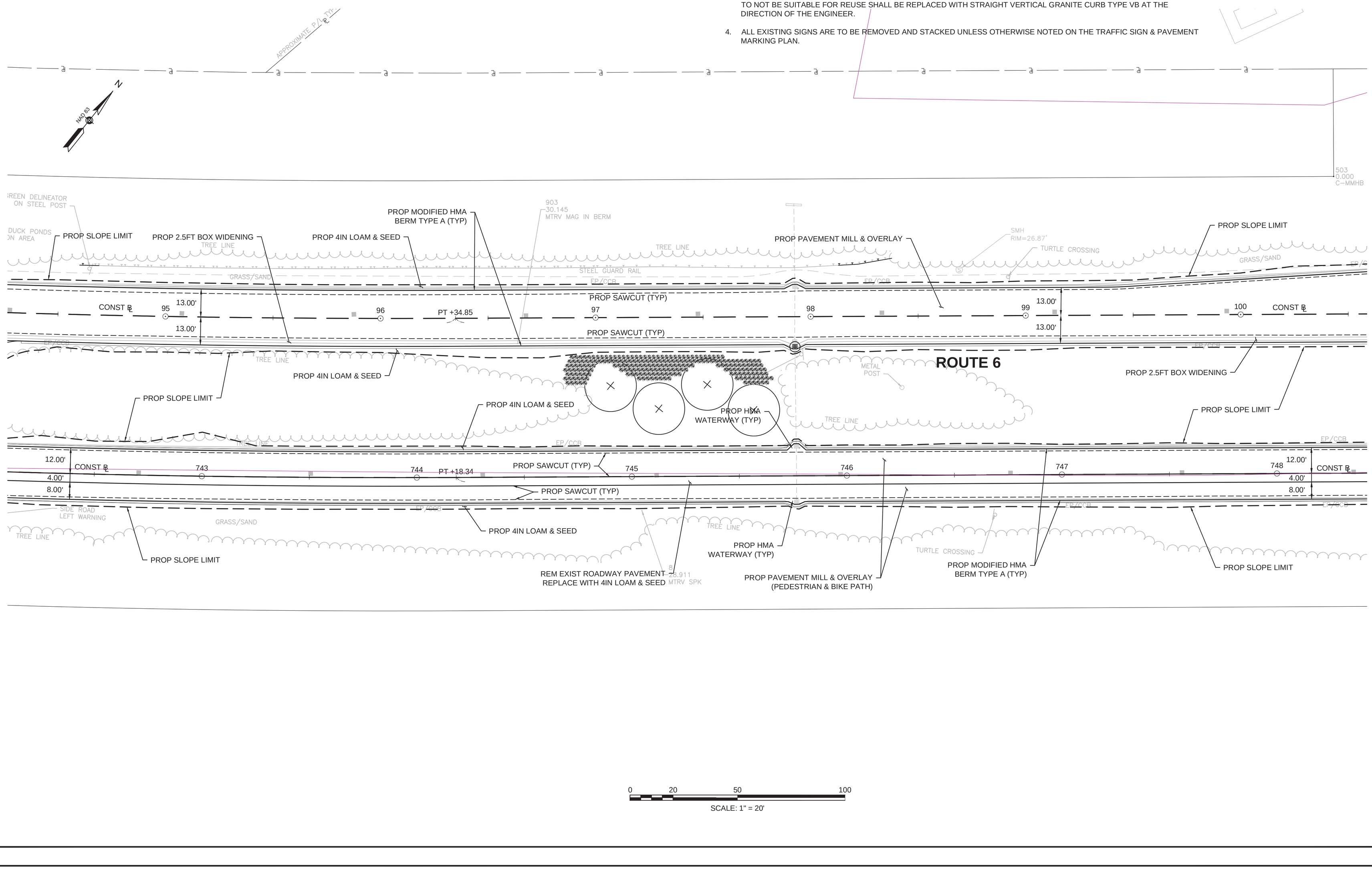
NONE

DRAINAGE DETAILS

SEE SHEET 138

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:40 AM
Proposal No. 608744-136412
AM0808 - 197

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	039	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 10

608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:40 AM

Proposal No. 608744-136412

AW88869 - 168

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

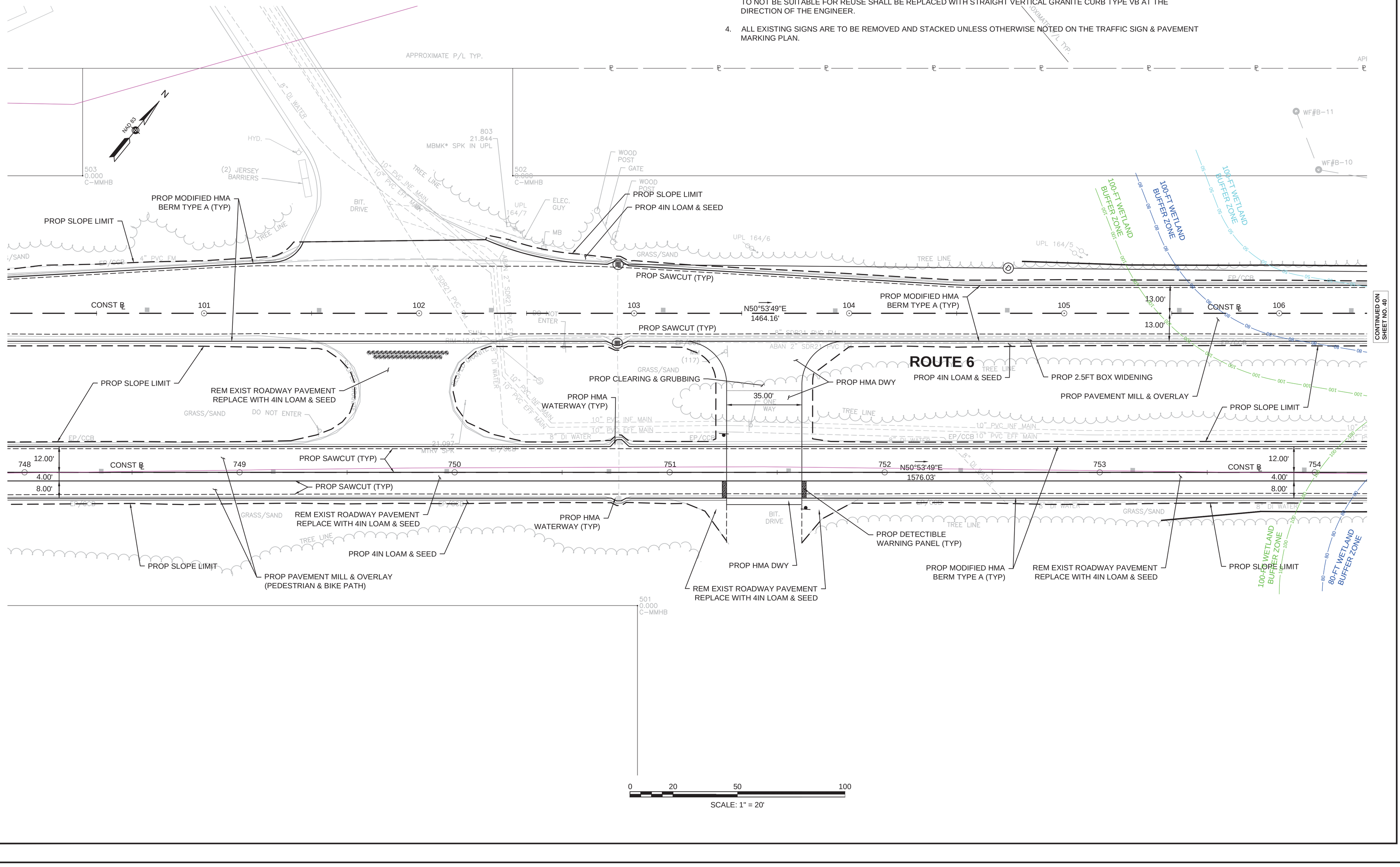
NONE

DRAINAGE DETAILS

SEE SHEET 139

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



CONTINUED ON SHEET NO. 38

CONTINUED ON SHEET NO. 40

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	040	280
PROJECT FILE NO.		608744	

CONSTRUCTION PLANS - 11

608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:40 AM

Proposal No. 608744-136412

AV808069 - 169

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

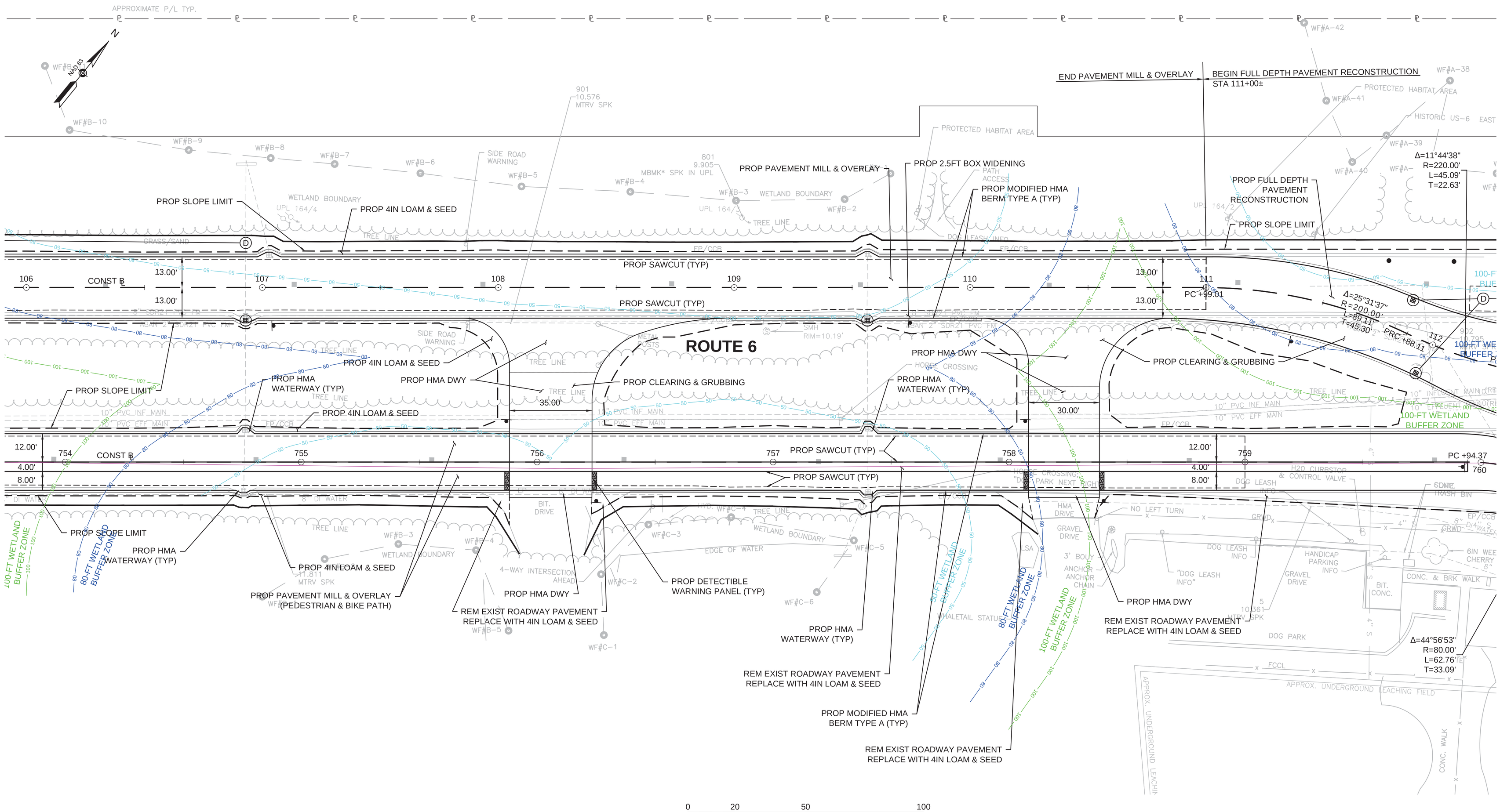
NONE

DRAINAGE DETAILS

SEE SHEET 140

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	041	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 12

608744_HD(CP_RTE6).DWG Plotted on 1-Aug-2025 8:40 AM

Proposal No. 608744-13412

AM8960 - 170

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

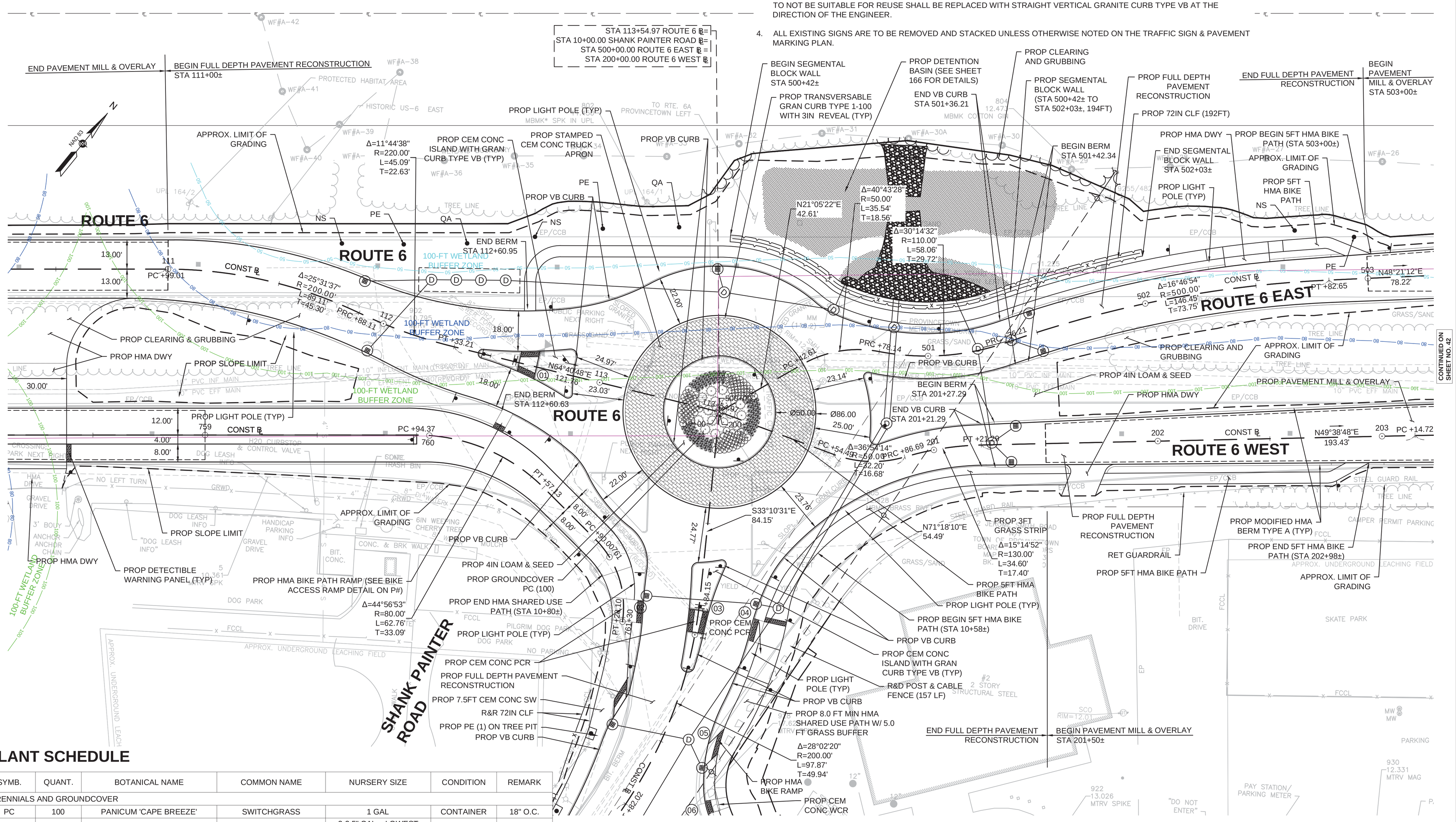
NONE

DRAINAGE DETAILS

SEE SHEET 141

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	CONDITION	REMARK
PERENNIALS AND GROUNDCOVER						
PC	100	PANICUM 'CAPE BREEZE'	SWITCHGRASS	1 GAL	CONTAINER	18" O.C.
NS	3	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT		30' O.C.
PE	3		PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT		30' O.C.
QA	2		WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT		30' O.C.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	042	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 13

HIGHWAY GUARD DETAILS
NONE

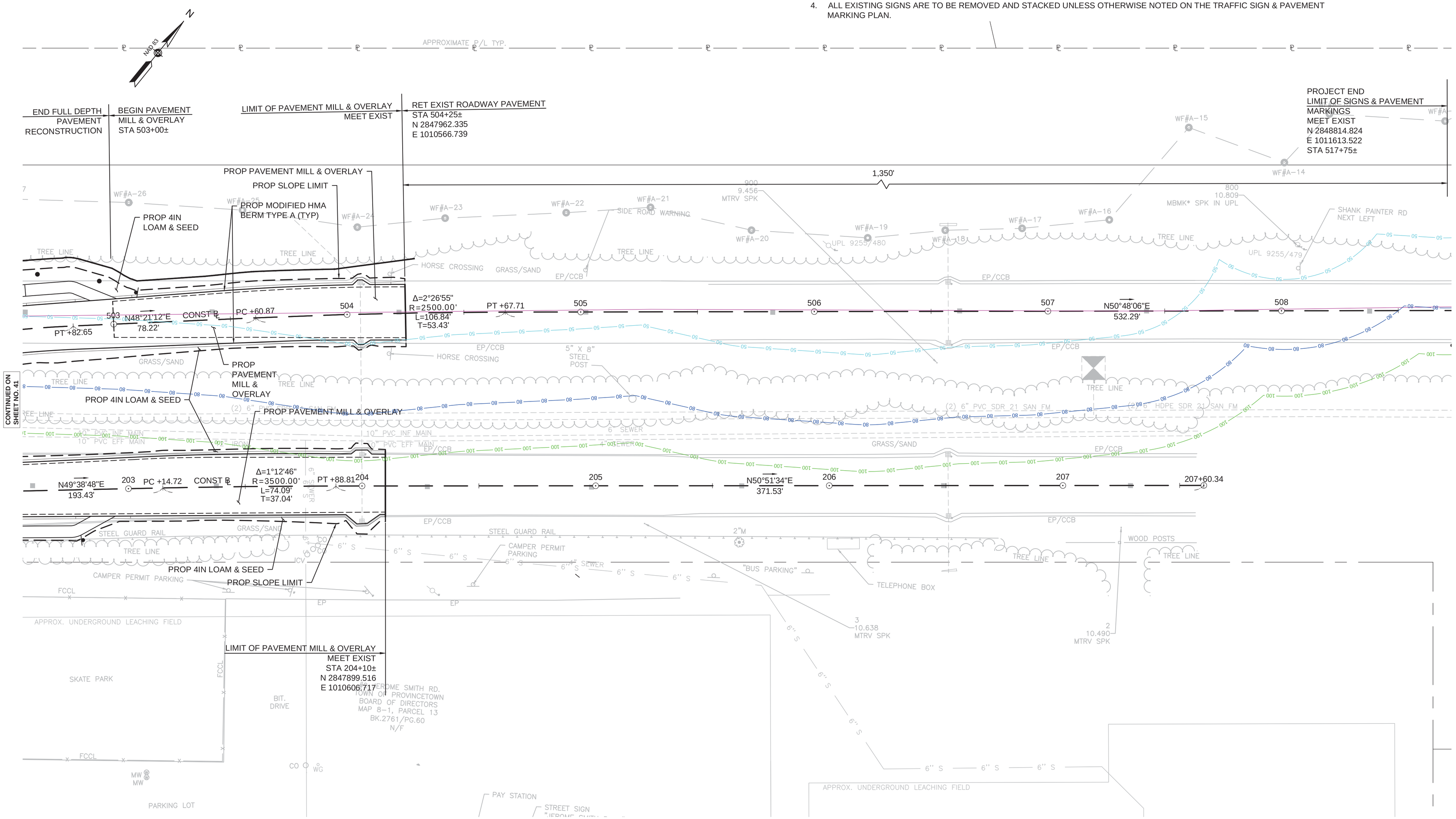
TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 142

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	043	280
PROJECT FILE NO.		608744	

CONSTRUCTION PLANS - 14

608744_HD(CP_SHANK).DWG Plotted on 31-Jul-2025 3:19 PM

Proposal No. 608744-136412

AM8860 - 172

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

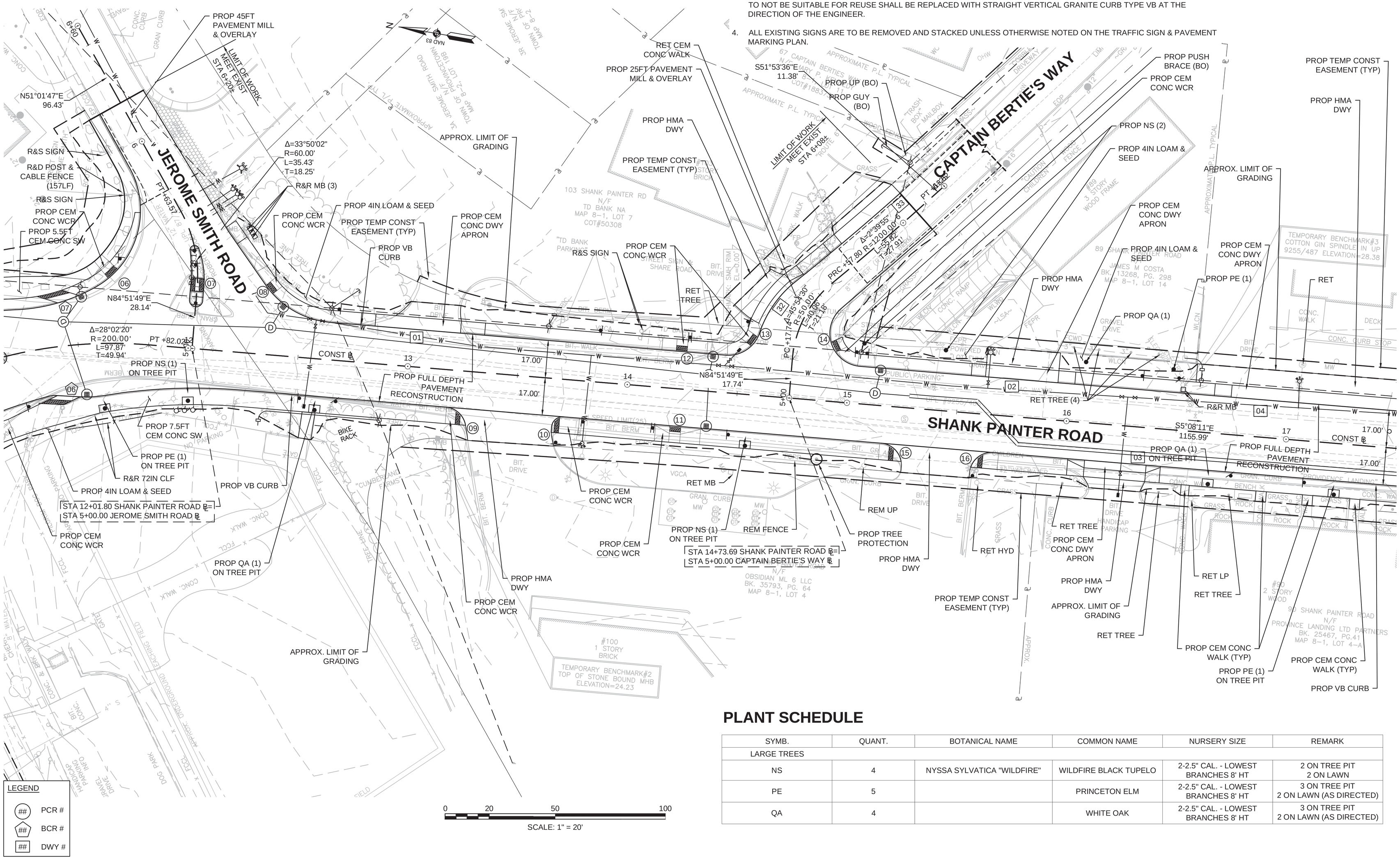
SEE SHEET 143 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 143

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	4	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT 2 ON LAWN
PE	5		PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	3 ON TREE PIT 2 ON LAWN (AS DIRECTED)
QA	4		WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	3 ON TREE PIT 2 ON LAWN (AS DIRECTED)

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 144 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 144

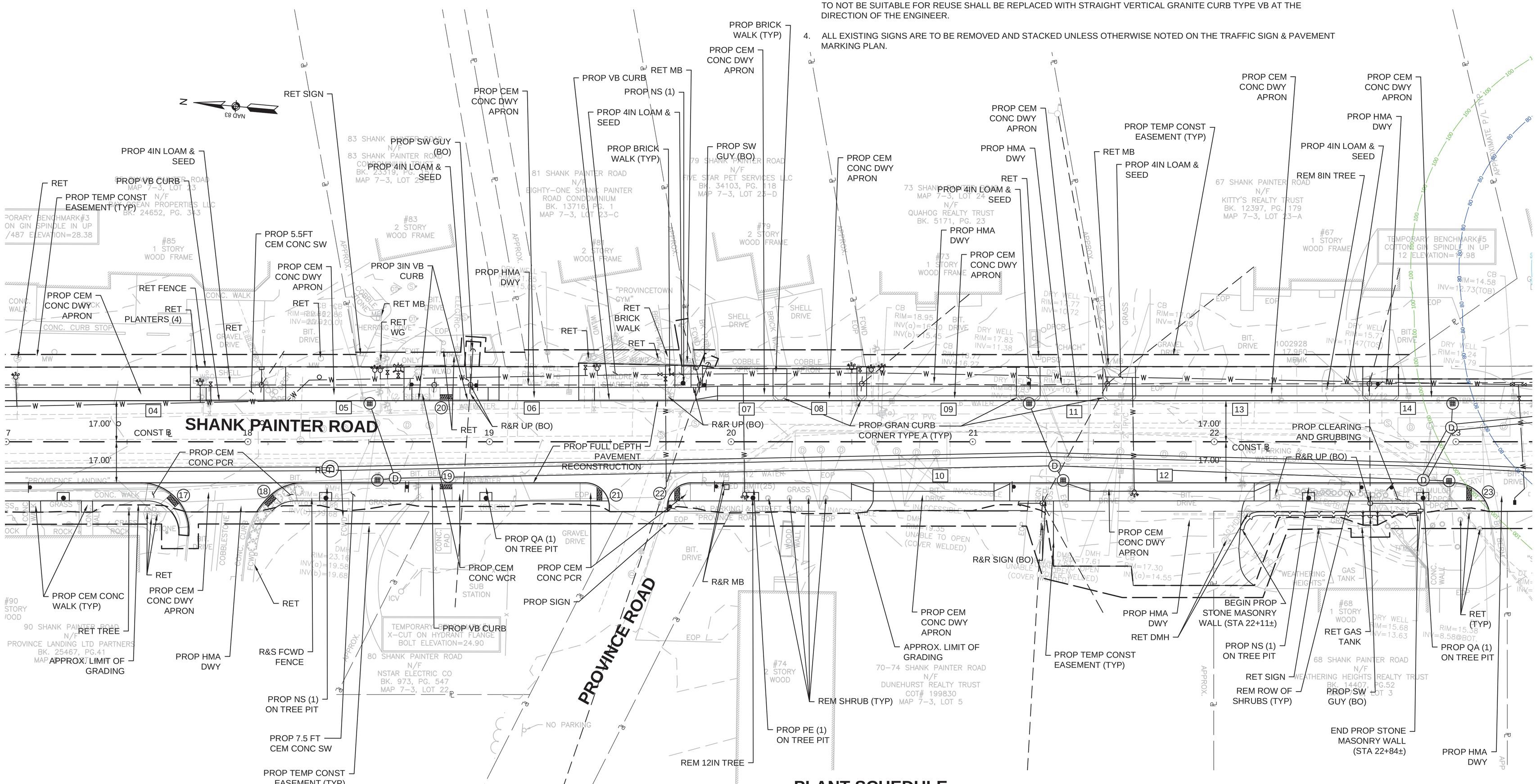
NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	044	280
PROJECT FILE NO.			

CONSTRUCTION PLANS - 15



LEGEND

- ## PCR #
- ## BCR #
- ## DWY #

PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	3	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT 1 ON LAWN
PE	2		PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
QA	2		WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	2 ON TREE PIT

608744_HD(CP_SHANK).DWG Plotted on 31-Jul-2025 3:20 PM
Proposal No. 608744-136412
A008960 - 173

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	045	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 16

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

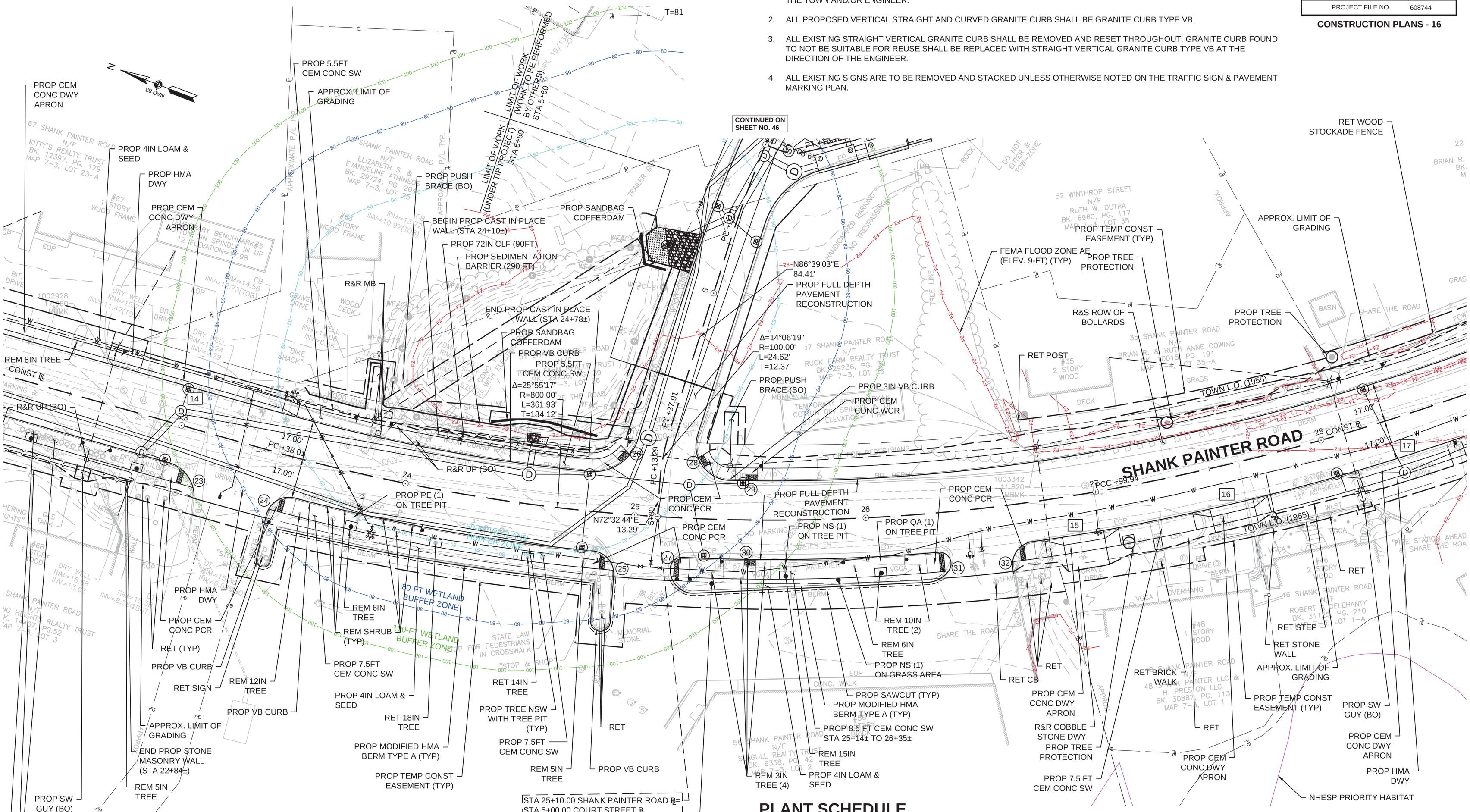
SEE SHEET 145 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 145

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	2	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
PE	2		PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
QA	2		WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN

608744_HD(CP_SHANK).DWG Plotted on 31-Jul-2025 3:20 PM

Proposal No. 608744-136412

A008960 - 174

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	046	280
PROJECT FILE NO.			

CONSTRUCTION PLANS - 17

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

SEE SHEET 146 (BY OTHERS)

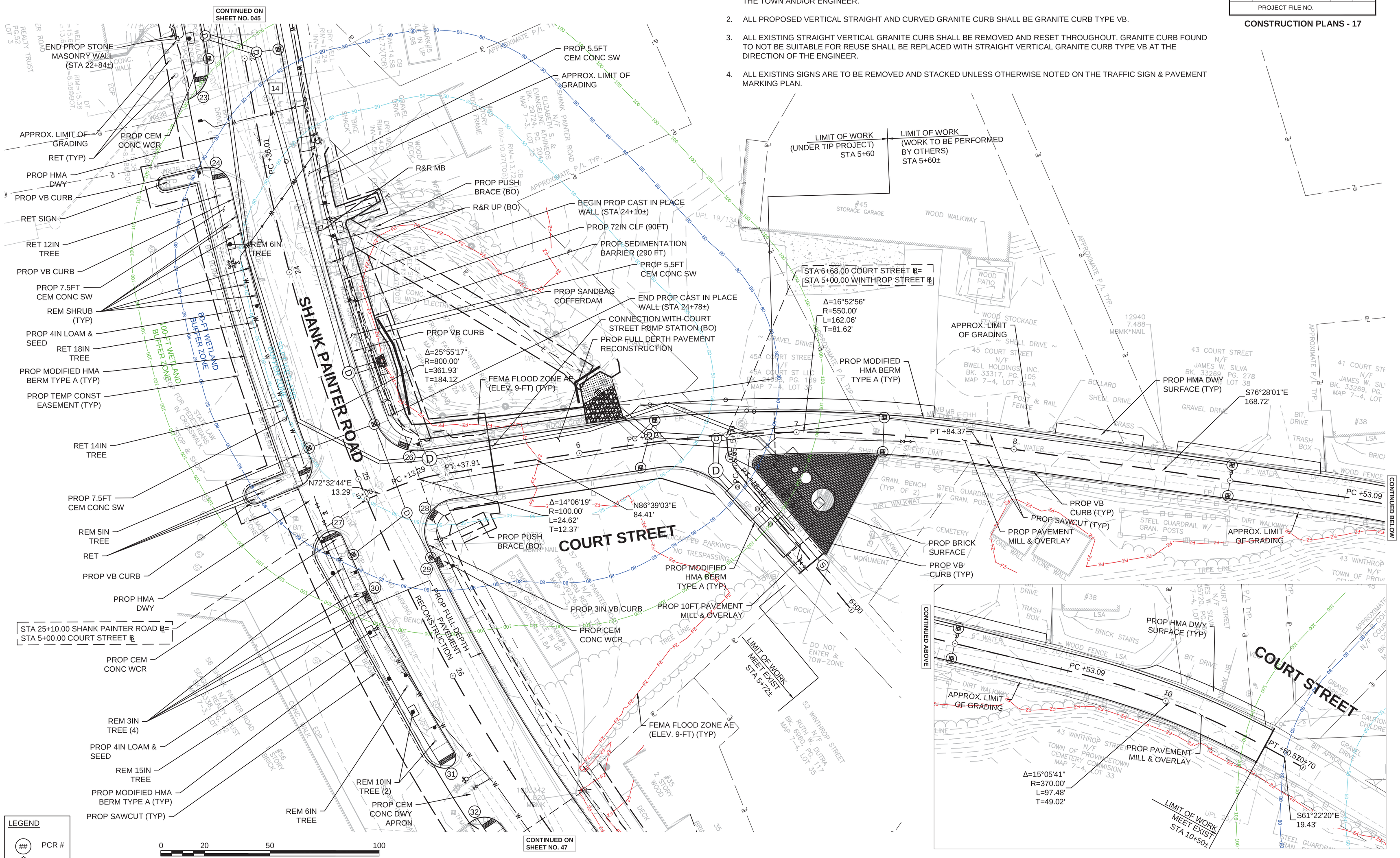
DRAINAGE DETAILS

SEE SHEET 146

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.

CONTINUED ON SHEET NO. 045



608744_HD(CP_SHANK).DWG Plotted on 31-Jul-2025 3:20 PM
Proposal No. 608744-136412
A000660 - 175

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	047	280
PROJECT FILE NO.	608744		

CONSTRUCTION PLANS - 18

HIGHWAY GUARD DETAILS

STA 32+83 TO 32+92 LT (TRAILING ANCHORAGE)
STA 32+92 TO 34+05 LT (GUARDRAIL, TL3 SINGLE FACED. DEEP POST)
STA 34+05 TO 34+30 LT (GUARDRAIL TANGENT END TREATMENT, TL3)

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

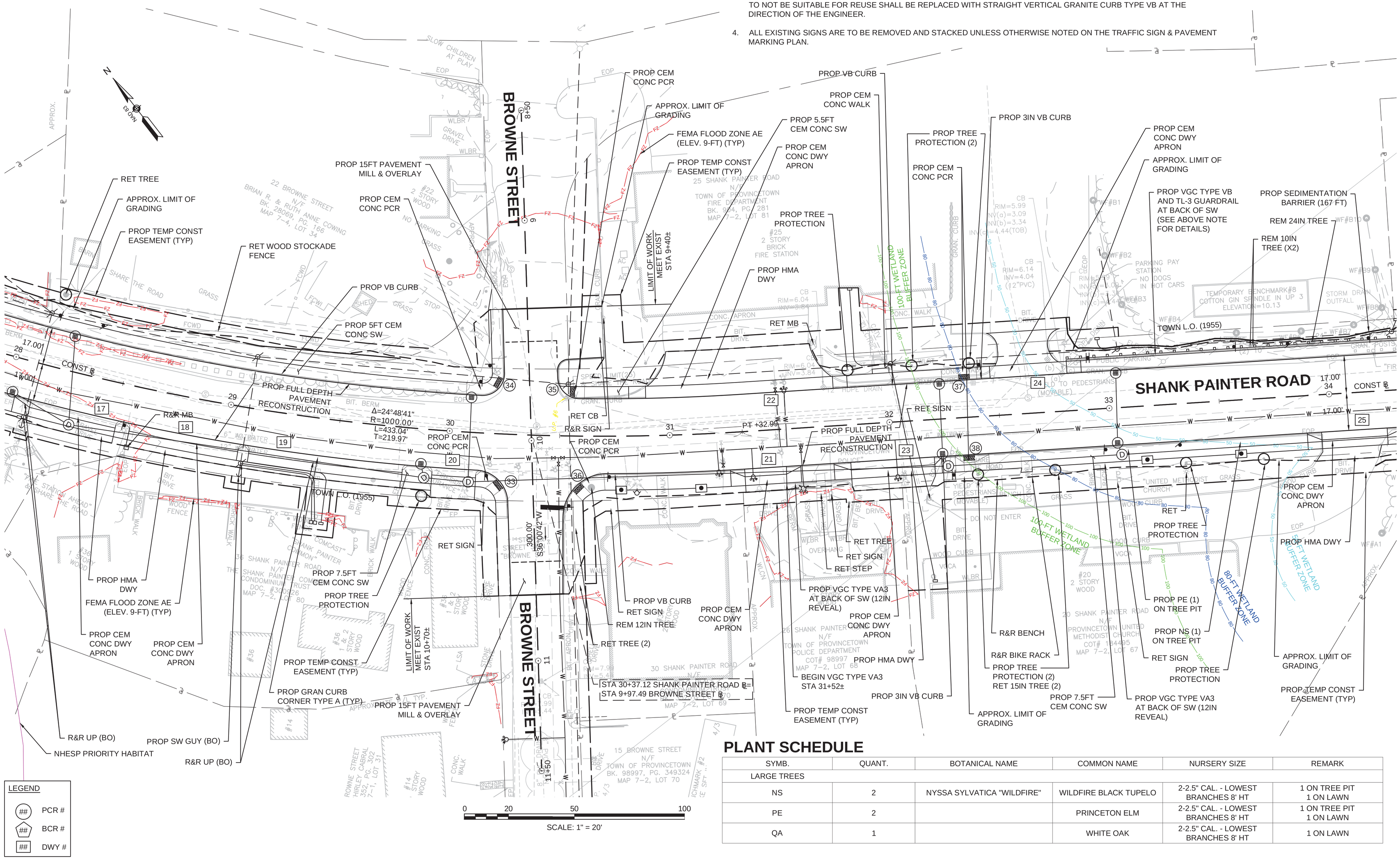
SEE SHEET 147 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 147

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	2	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
PE	2		PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
QA	1		WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON LAWN

608744_HD(CP_SHANK).DWG Plotted on 31-Jul-2025 3:21 PM
Proposal No. 608744-136412
AW8869 - 176

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

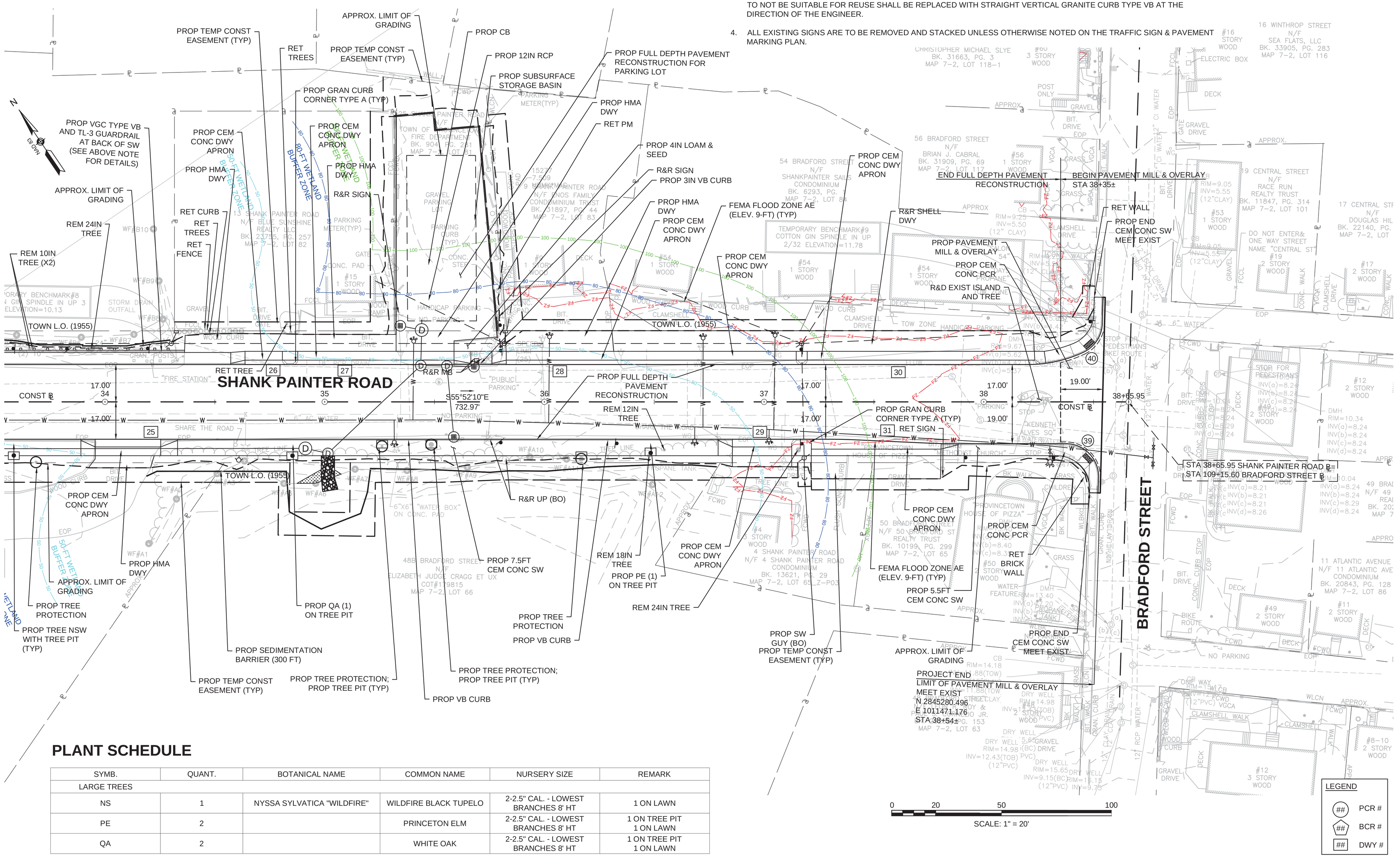
SEE SHEET 148 (BY OTHERS)

DRAINAGE DETAILS

SEE SHEET 148

NOTES:

1. REMOVE AND STACK ALL EXISTING CURVED VERTICAL GRANITE CURB UNLESS OTHERWISE NOTED OR AS DIRECTED BY THE TOWN AND/OR ENGINEER.
2. ALL PROPOSED VERTICAL STRAIGHT AND CURVED GRANITE CURB SHALL BE GRANITE CURB TYPE VB.
3. ALL EXISTING STRAIGHT VERTICAL GRANITE CURB SHALL BE REMOVED AND RESET THROUGHOUT. GRANITE CURB FOUND TO NOT BE SUITABLE FOR REUSE SHALL BE REPLACED WITH STRAIGHT VERTICAL GRANITE CURB TYPE VB AT THE DIRECTION OF THE ENGINEER.
4. ALL EXISTING SIGNS ARE TO BE REMOVED AND STACKED UNLESS OTHERWISE NOTED ON THE TRAFFIC SIGN & PAVEMENT MARKING PLAN.



PLANT SCHEDULE

SYMB.	QUANT.	BOTANICAL NAME	COMMON NAME	NURSERY SIZE	REMARK
LARGE TREES					
NS	1	NYSSA SYLVATICA "WILDFIRE"	WILDFIRE BLACK TUPELO	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON LAWN
PE	2		PRINCETON ELM	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN
QA	2		WHITE OAK	2-2.5" CAL. - LOWEST BRANCHES 8' HT	1 ON TREE PIT 1 ON LAWN

LEGEND

(##) PCR #

<##> BCR #

[##] DWY #

608744_HD(CP_SHANK).DWG Plotted on 31-Jul-2025 3:21 PM

Proposal No. 608744-136412

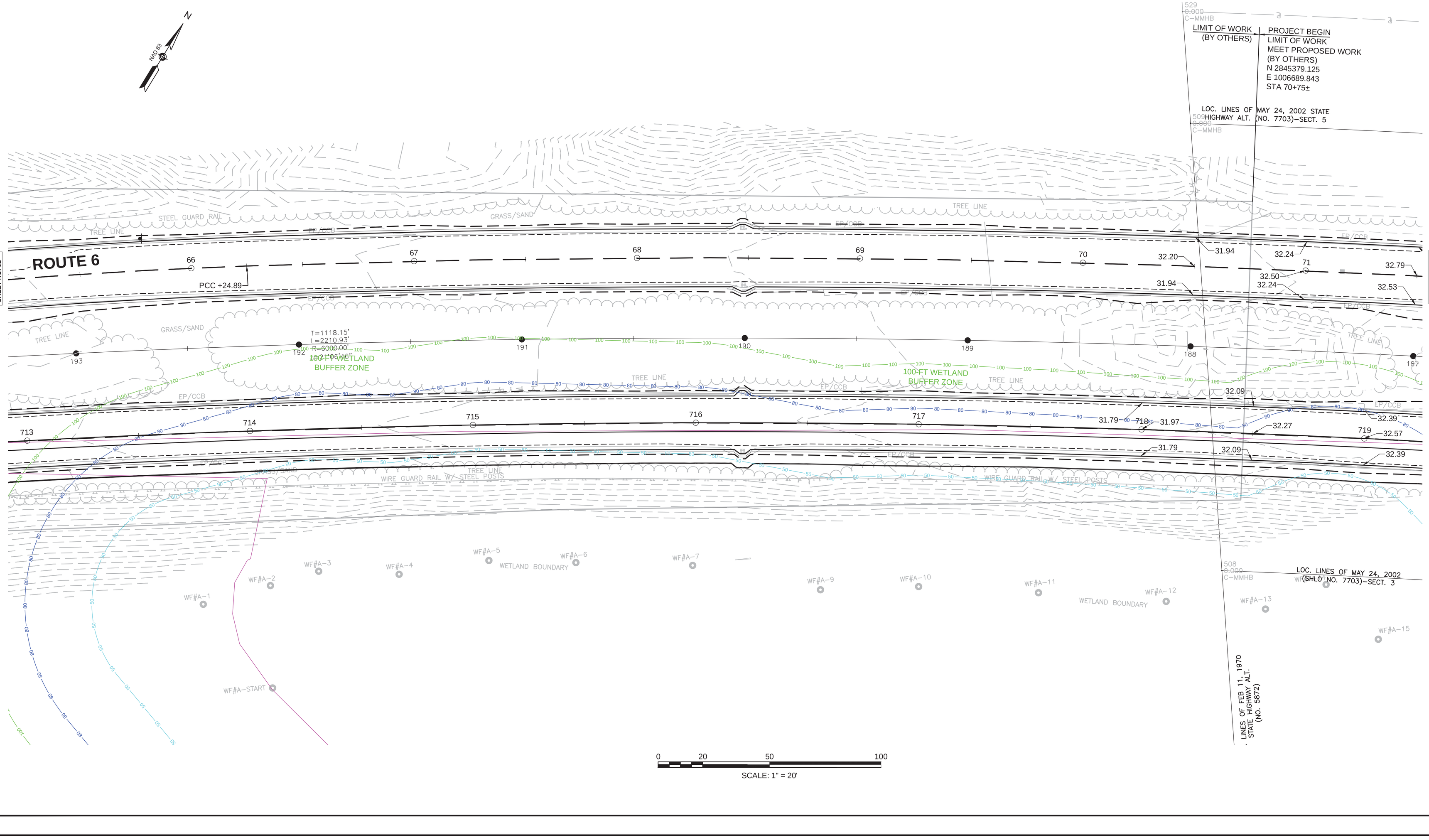
A088069 - 177

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	093	280
PROJECT FILE NO.	608744		

GRADING PLANS - 04

608744_HD(GR_RTE6).DWG Plotted on 31-Jul-2025 3:26 PM
Proposal No. 608744-136412
AM8860 - 178

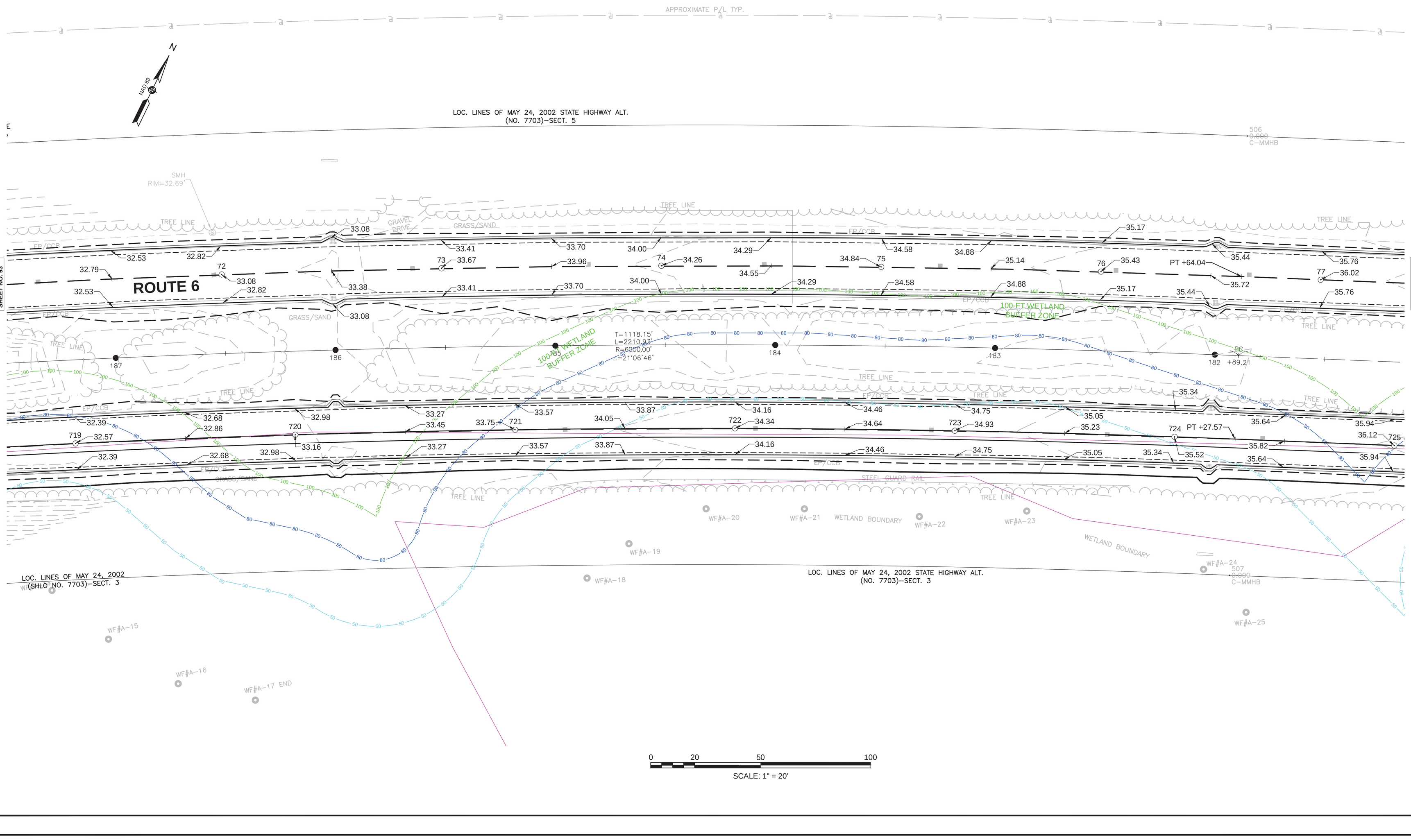


PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	094	280
PROJECT FILE NO.	608744		

GRADING PLANS - 05

608744_HD(GR_RTE6).DWG Plotted on 31-Jul-2025 3:26 PM
Proposal No. 608744-136412
A008969 - 179



PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

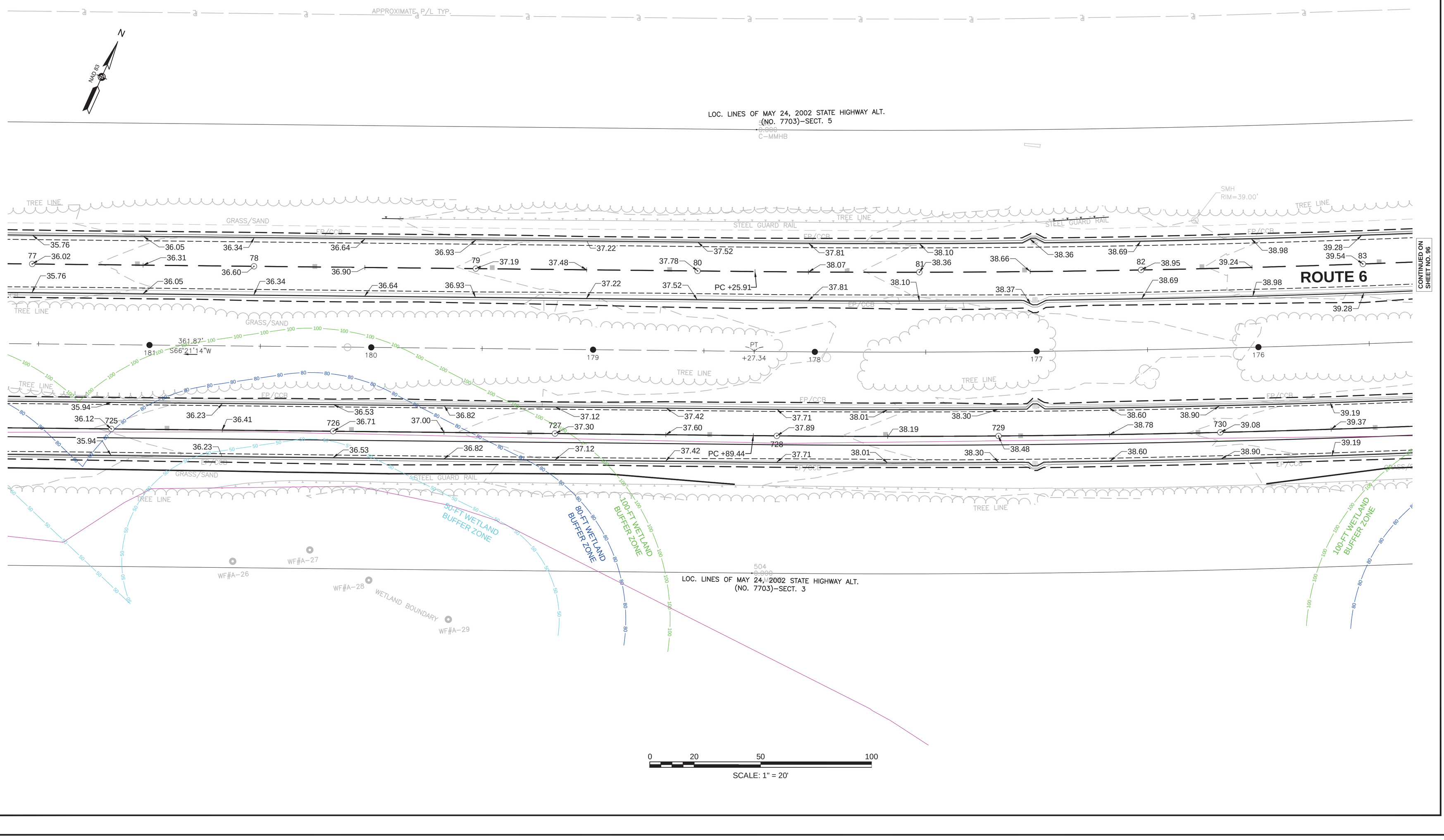
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	095	280
PROJECT FILE NO.	608744		

GRADING PLANS - 06

608744_HD(GR_RTE6).DWG Plotted on 31-Jul-2025 3:26 PM

Proposal No. 608744-136412

AM0869 - 180

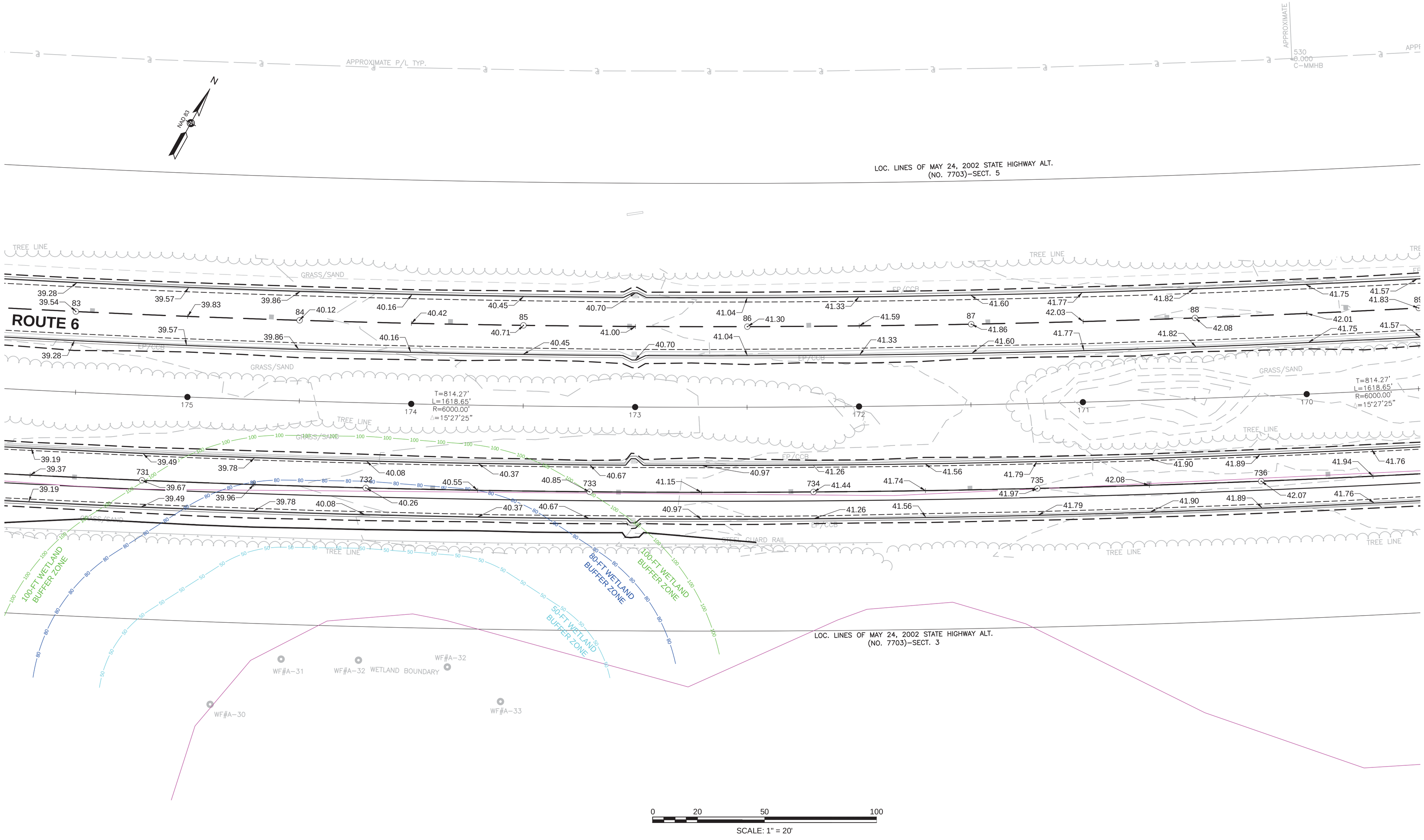


PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	096	280
PROJECT FILE NO.	608744		

GRADING PLANS - 07

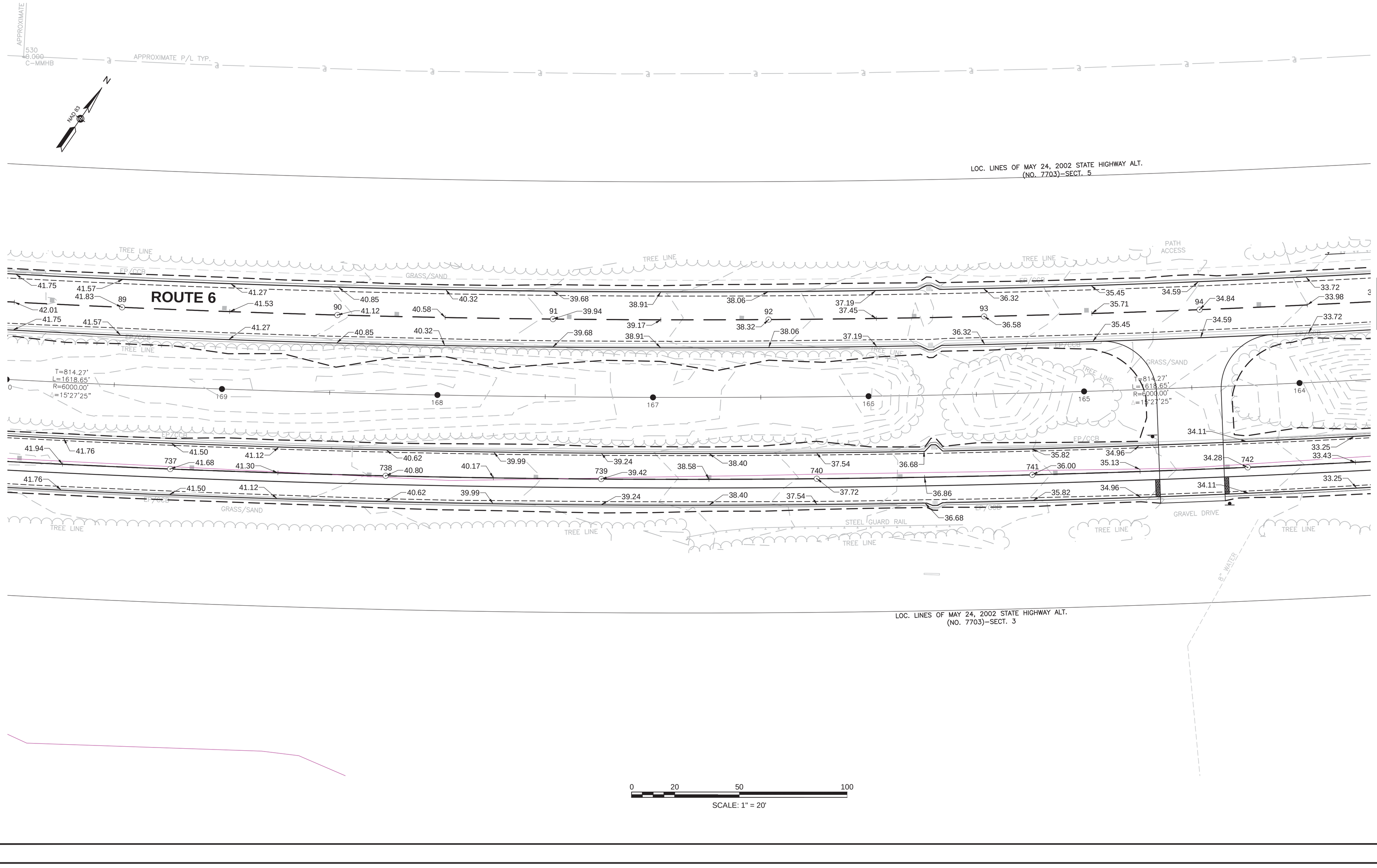
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Proposal No. 608744-136412
A008669 - 181



PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	097	280
PROJECT FILE NO.	608744		

GRADING PLANS - 08



0 20 50 100

SCALE: 1" = 20'

608744_HDGR_RTE6).DWG Plotted on 31-Jul-2025 3:27 PM

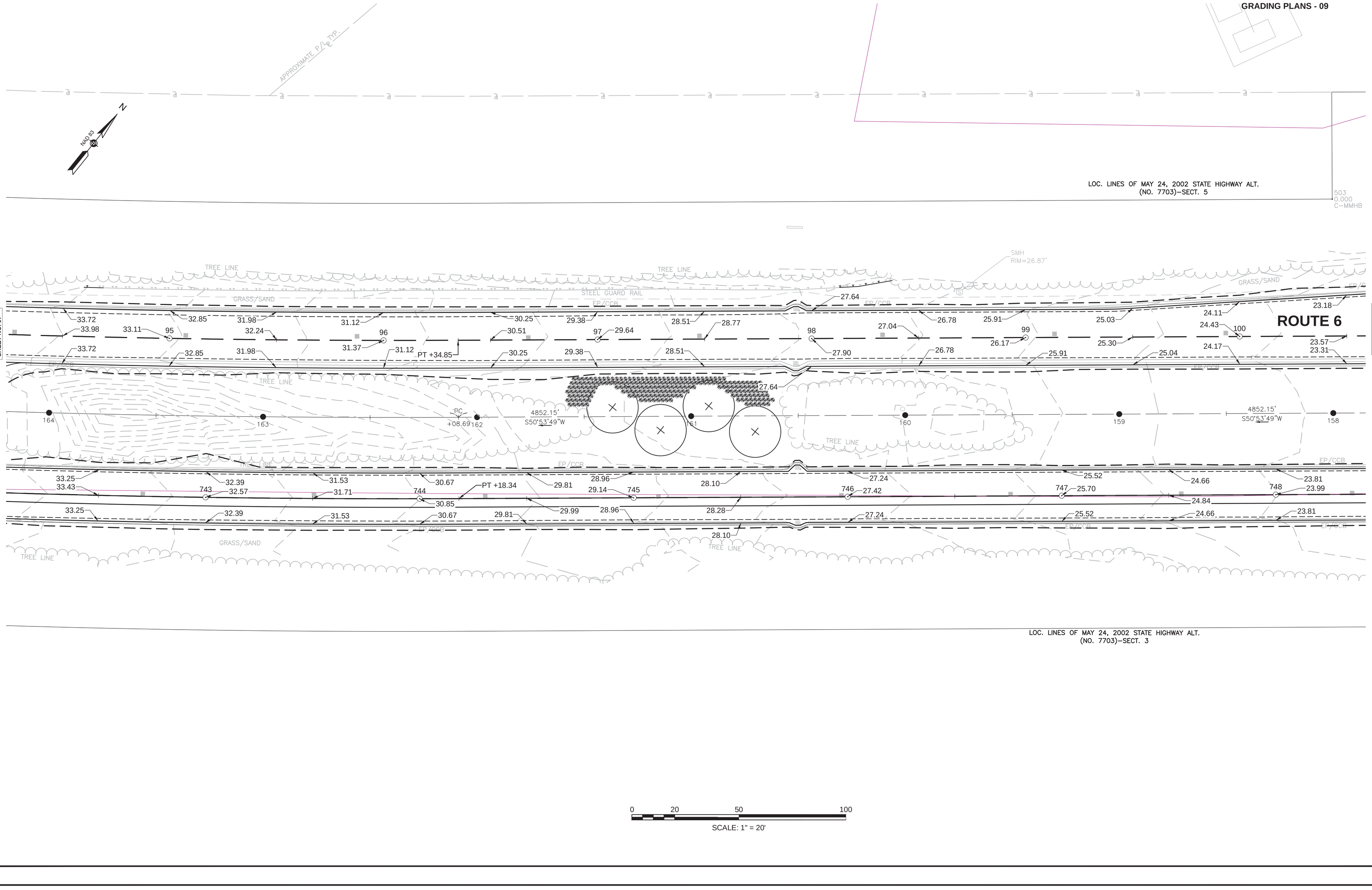
Proposal No. 608744-134412

AW8869 - 182

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	098	280
PROJECT FILE NO.	608744		

GRADING PLANS - 09



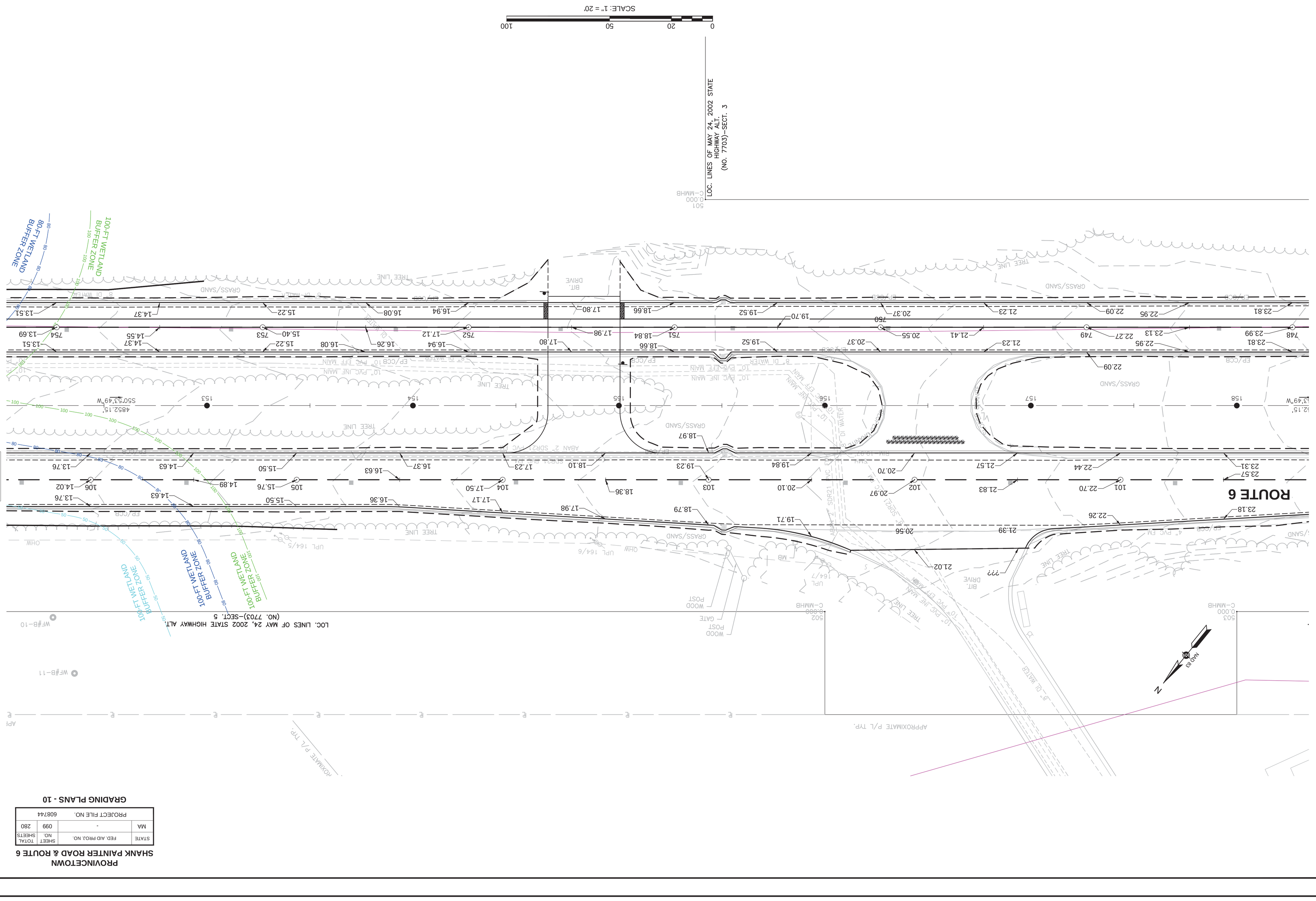
0 20 50 100

SCALE: 1" = 20'

608744_HD(GR_RTE6).DWG Plotted on 31-Jul-2025 3:27 PM

Proposal No. 608744-136412

A008860 - 183


SCALE: 1" = 20'
0
20
50
100
LOC. LINES OF MAY 24, 2002 STATE HIGHWAY ALT. (NO. 7703)–SECT. 3
501
0.000
C–MMHB
80-FT WETLAND BUFFER ZONE
100-FT WETLAND BUFFER ZONE
TREE LINE
GRASS/SAND
BIT. DRIVE
8" DI WATER
EP/CCB
10" PVC INF MAIN
10" PVC EFF MAIN
ROUTE 6
CONTINUED ON SHEET NO. 100
CONTINUED ON SHEET NO. 98
LOC. LINES OF MAY 24, 2002 STATE HIGHWAY ALT. (NO. 7703)–SECT. 5
WOOD POST
GATE
502
8.888
C–MMHB
503
0.000
C–MMHB
N40°03'
APPROXIMATE P/L TYP.
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6
GRADING PLANS - 10
PROJECT FILE NO. 608744
STATE MA
FED. AID PROJ. NO. -
SHEET NO. 099
TOTAL SHEETS 280

SCALE: 1" = 20'

0 20 50 100

ROUTE 6

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	100	280

PROJECT FILE NO. 608744

GRADING PLANS - 11

CONTINUED ON SHEET NO. 101

CONTINUED ON SHEET NO. 99

LOC. LINES OF MAY 24, 2002 STATE HIGHWAY ALT.
(NO. 7703)–SECT. 5

100-FT WETLAND BUFFER ZONE

80-FT WETLAND BUFFER ZONE

50-FT WETLAND BUFFER ZONE

APPROXIMATE P/L TYP.

NAD 83

Proposal No. 608744-136412

608744_HDGR_RTE6).DWG Plotted on 31-Jul-2025 3:27 PM

A00604 - 183

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	101	280
PROJECT FILE NO.		608744	

GRADING PLANS - 12

608744_HD(GR_RTE6).DWG Plotted on 31-Jul-2025 3:28 PM

Proposal No. 608744-134412

A080609 - 186

APPROXIMATE P/L TYP.

STA 500+43 ROUTE 6 EASTBOUND ℄ =
STA 1+78.58 ROUNDABOUT ℄

STA 113+11.97 ROUTE 6 COMBINED ℄ =
STA 2+80.95 ROUNDABOUT ℄

LOC. LINES OF MAY 24, 2002 STATE HIGHWAY ALT.
(NO. 7703)–SECT. 5

LOC. LINES OF MAY 24, 2002 STATE HIGHWAY ALT.
(NO. 7703)–SECT. 5

NAD 83

ROUTE 6

ROUTE 6 EASTBOUND

ROUTE 6 WESTBOUND

SHANK PAINTER ROAD

STA 200+43 ROUTE 6 WESTBOUND ℄ =
STA 1+40.89 ROUNDABOUT ℄

STA 10+43 SHANK PAINTER ℄ =
STA 3+54.39 ROUNDABOUT ℄

CONTINUED ON SHEET NO. 100

CONTINUED ON SHEET NO. 102

CONTINUED ON SHEET NO. 103

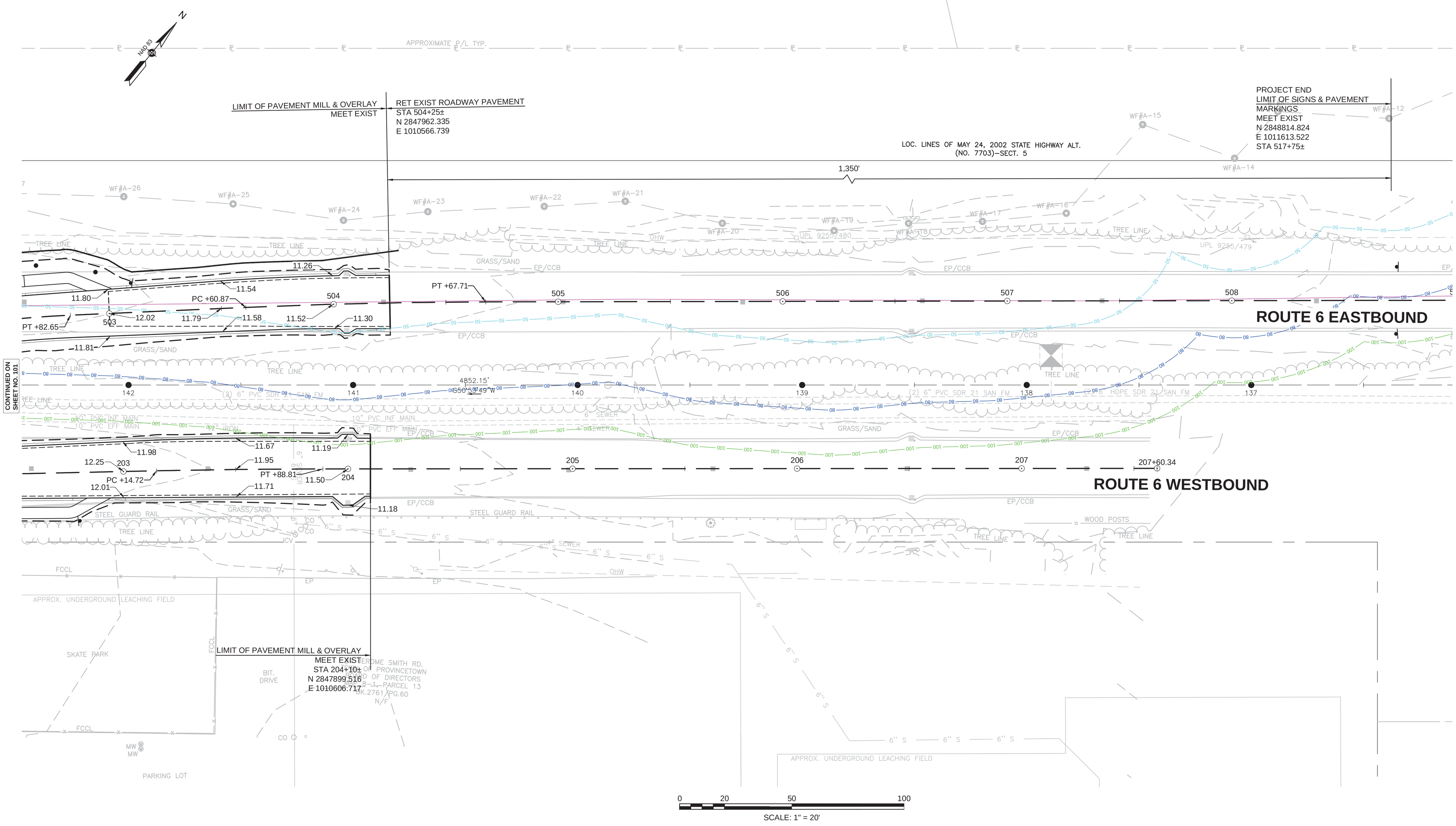
0 20 50 100

SCALE: 1" = 20'

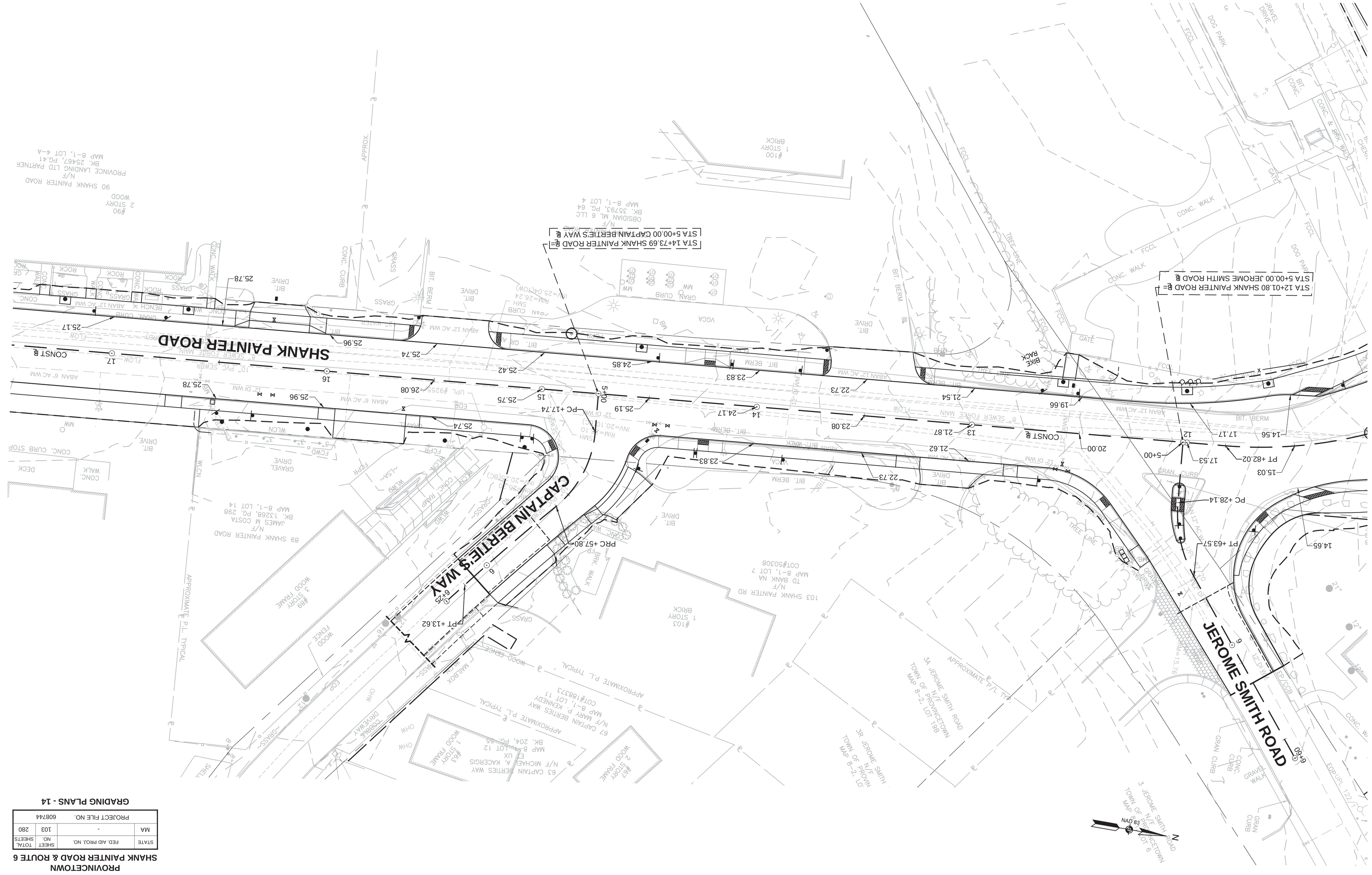
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	102	280
PROJECT FILE NO.		608744	

GRADING PLANS - 13



608744_HDGR_RTE6).DWG Plotted on 31-Jul-2025 3:28 PM
Proposal No. 608744-136412
A98869 - 187


SCALE: 1" = 20'
0
20
50
100
SHANK PAINTER ROAD
CAPTAIN BERTIE'S WAY
JEROME SMITH ROAD
STA 14+73.69 SHANK PAINTER ROAD ℄=
STA 5+00.00 CAPTAIN BERTIE'S WAY ℄
STA 12+01.80 SHANK PAINTER ROAD ℄=
STA 5+00.00 JEROME SMITH ROAD ℄
CONTINUED ON SHEET NO. 104
CONTINUED ON SHEET NO. 101
CONST ℄
PC +17.74
PT +13.62
PRC +57.80
PC +28.14
PT +63.57
PT +82.02
5+00
APPROX. ℄ P.L. TYPICAL
BIT. DRIVE
BIT. BERM
CONC. WALK
CONC. & BRK. WALK
FCCL
GATE
TREE LINE
DOG PARK
GRAVEL DRIVE
BIT. CONC.
CONC. CURB
GRAN. CURB
GRASS
WOOD FENCE
BIKE RACK
89 SHANK PAINTER ROAD
JAMES M COSTA
BK. 13268, PG. 298
MAP 8-1, LOT 14
90 SHANK PAINTER ROAD
PROVINCE LANDING LTD PARTNER
BK. 25467, PG.41
MAP 8-1, LOT 4-A
103 SHANK PAINTER ROAD
TD BANK NA
MAP 8-1, LOT 7
COT#50308
63 CAPTAIN BERTIES WAY
N/F MICHAEL A. KACERGIS
MAP 8-1, LOT 12
BK. 204, PG. 68
67 CAPTAIN BERTIES WAY
N/F MARY P. KENNEDY
MAP 8-1, LOT 11
COT#183373
3A JEROME SMITH ROAD
TOWN OF PROVINCETOWN
MAP 8-2, LOT 19B
3R JEROME SMITH
TOWN OF PROVIN
MAP 8-2, LOT
3 JEROME SMITH ROAD
TOWN OF PROVINCETOWN
MAP 8-2, LOT 6
#100 1 STORY BRICK
#89 2 STORY WOOD
#103 1 STORY BRICK
#63 1 STORY WOOD FRAME
#67 2 STORY WOOD FRAME
OBSIDIAN ML 6 LLC
BK. 35793, PG. 64
MAP 8-1, LOT 4
N/F
N/F
N/F

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

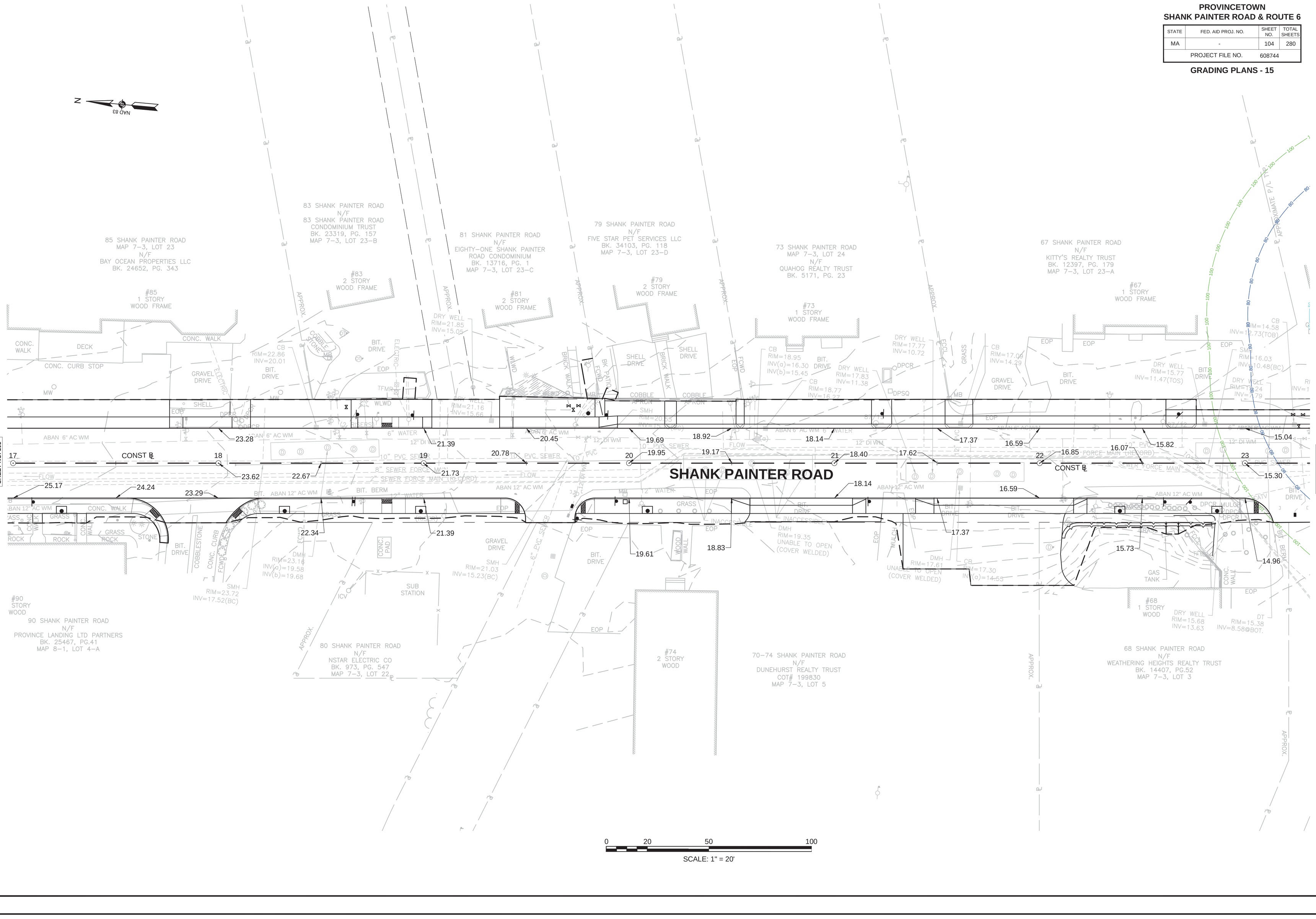
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	104	280
PROJECT FILE NO.	608744		

GRADING PLANS - 15

608744_HD(GR_SHANK).DWG Plotted on 31-Jul-2025 3:29 PM

Proposal No. 608744-11641-2

AV08809 - 189



PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	105	206
PROJECT FILE NO.	608744		

GRADING PLANS - 16

608744_HD(GR_SHANK).DWG Plotted on 31-Jul-2025 3:29 PM

Proposal No. 608744-136412

AW8069 - 190

CONTINUED ON SHEET NO. 104

CONTINUED ON SHEET NO. 106

CONTINUED ON SHEET NO. 107

NAD 83

STA 6+68.00 COURT STREET ℄ =
STA 5+00.00 WINTHROP STREET ℄

STA 25+10.00 SHANK PAINTER ROAD ℄ =
STA 5+00.00 COURT STREET ℄

COURT STREET

SHANK PAINTER ROAD

FEMA FLOOD ZONE AE
(ELEV. 9-FT) (TYP)

80-FT WETLAND
BUFFER ZONE

100-FT WETLAND
BUFFER ZONE

50-FT WETLAND
BUFFER ZONE

NHESP PRIORITY HABITAT

TOWN L.O. (1955)

67 SHANK PAINTER ROAD N/F
KITTY'S REALTY TRUST
BK. 12397, PG. 179
MAP 7–3, LOT 23–A

63 SHANK PAINTER ROAD N/F
ELIZABETH S. & EVANGELINE ATHINEOS
BK. 29724, PG. 204
MAP 7–3, LOT 25

57 SHANK PAINTER ROAD N/F
TRUCK FARM REALTY TRUST
BK. 29236, PG. 39
MAP 7–3, LOT 26

52 WINTHROP STREET N/F
RUTH W. DUTRA
BK. 6960, PG. 117
MAP 7–4, LOT 35

35 SHANK PAINTER ROAD N/F
BRIAN R. & RUTH ANNE COWING
BK. 10015, PG. 191
MAP 7–4, LOT 35–A

46 SHANK PAINTER ROAD N/F
ROBERT A. DELEHANTY
BK. 31125, PG. 210
MAP 7–3, LOT 1–A

48 SHANK PAINTER ROAD N/F
48 SHANK PAINTER LLC &
H. PRESTON LLC
BK. 30887, PG. 113
MAP 7–3, LOT 1

56 SHANK PAINTER ROAD N/F
SEAGULL REALTY TRUST
BK. 6338, PG. 42
MAP 7–3, LOT 2

68 SHANK PAINTER ROAD N/F
KING HEIGHTS REALTY TRUST
BK. 14407, PG.52
MAP 7–3, LOT 3

0 20 50 100

SCALE: 1" = 20'

SCALE: 1" = 20'

0 20 50 100

CONTINUED ON SHEET NO. 107

CONTINUED ABOVE

CONTINUED BELOW

CONTINUED ON SHEET NO. 105

STA 25+10.00 SHANK PAINTER ROAD ℄

STA 5+00.00 COURT STREET ℄

STA 6+68.00 COURT STREET ℄

STA 5+00.00 WINTHROP STREET ℄

SHANK PAINTER ROAD

COURT STREET

PC +53.09

PT +84.38

PC +53.09

PT +50.51

PC +53.09

PC +22.31

PT +48.12

PC 05 65 5100

PT +37.91

PC +13.29

PC +38.01

6.00

5+00

10.02 10.36 10.85 10.51 10.51 11.16 11.46 11.12 10.37 10.49 8.12 6.42 6.35 8.24 6 8.00 6.13 10.44 12.20 12.63 12.63 12.97 13.41 13.75 14.18 14.52 14.96 15.04 15.30

FEMA FLOOD ZONE AE (ELEV. 9-FT) (TYP)

FEMA FLOOD ZONE AE (ELEV. 9-FT) (TYP)

80-FT WETLAND BUFFER ZONE

100-FT WETLAND BUFFER ZONE

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	106	280

PROJECT FILE NO. 608744

GRADING PLANS - 17

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	107	280
PROJECT FILE NO.	608744		

GRADING PLANS - 18

608744_HD(GR_SHANK).DWG Plotted on 31-Jul-2025 3:30 PM

Proposal No. 608744-1-1-1

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	108	280
PROJECT FILE NO.		608744	

GRADING PLANS - 19

608744_HD(GR_SHANK).DWG Plotted on 31-Jul-2025 3:30 PM

Proposal No. 608744-136412

AM08869 - 193

CONTINUED ON SHEET NO. 107

CONTINUED ON SHEET NO. 109

N

NAD83

SHANK PAINTER ROAD

BRADFORD STREET

STA 38+65.95 SHANK PAINTER ROAD ℄=
STA 109+15.60 BRADFORD STREET ℄

CONST ℄

34 35 36 37 38

38+65.95

107+50 108 109 110 110+50

50-FT WETLAND BUFFER ZONE

80-FT WETLAND BUFFER ZONE

100-FT WETLAND BUFFER ZONE

FEMA FLOOD ZONE AE (ELEV. 9-FT) (TYP)

TOWN L.O. (1955)

PROJECT END
LIMIT OF PAVEMENT MILL & OVERLAY
MEET EXIST
N 2845280.496
E 1011471.176
STA 38+54±

13 SHANK PAINTER ROAD N/F BLUE SUNSHINE REALTY LLC BK. 23755, PG. 257 MAP 7–2, LOT 82

TOWN OF PROVINCETOWN FIRE DEPARTMENT BK. 904, PG. 281 MAP 7–2, LOT 81

9 SHANK PAINTER ROAD N/F ENOS FAMILY CONDOMINIUM TRUST BK. 31897, PG. 44 MAP 7–2, LOT 83

4 SHANK PAINTER ROAD N/F 4 SHANK PAINTER ROAD CONDOMINIUM BK. 13621, PG. 29 MAP 7–2, LOT 65_Z–P03

50 BRADFORD STREET N/F 50 BRADFORD ST REALTY TRUST BK. 10199, PG. 299 MAP 7–2, LOT 65

48B BRADFORD STREET N/F

54 BRADFORD STREET N/F SHANKPAINTER SAILS CONDOMINIUM BK. 6293, PG. 1 MAP 7–2, LOT 84

56 BRADFORD STREET N/F BRIAN J. CABRAL BK. 31909, PG. 69 MAP 7–2, LOT 117

60 BRADFORD STREET N/F JEREMY SCOTT WOOLF & CHRISTOPHER MICHAEL SLYE BK. 31663, PG. 3 MAP 7–2, LOT 118–1

16 WINTHROP STREET N/F SEA FLATS, LLC BK. 33905, PG. 283 MAP 7–2, LOT 116

19 CENTRAL STREET N/F RACE RUN REALTY TRUST BK. 11847, PG. 314 MAP 7–2, LOT 101

17 CENTRAL STR N/F DOUGLAS HILL

11 ATLANTIC AVENUE N/F 11 ATLANTIC AVE CONDOMINIUM BK. 20843, PG. 128 MAP 7–2, LOT 86

49 BRADI N/F 49 E REALT BK. 202 MAP 7–

#4 3 STORY WOOD

#8–10 2 STORY WOOD

#9 1 STORY WOOD

#12 2 STORY WOOD

#12 3 STORY

#15 1 STORY WOOD

#16 2 STORY WOOD

#17 2 STORY WOOD

#19 2 STORY WOOD

#49 2 STORY WOOD

#50 2 STORY WOOD

#53 1 STORY WOOD

#54 1 STORY WOOD

#56 1 STORY WOOD

#60 3 STORY WOOD

0 20 50 100

SCALE: 1" = 20'

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	133	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 04

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

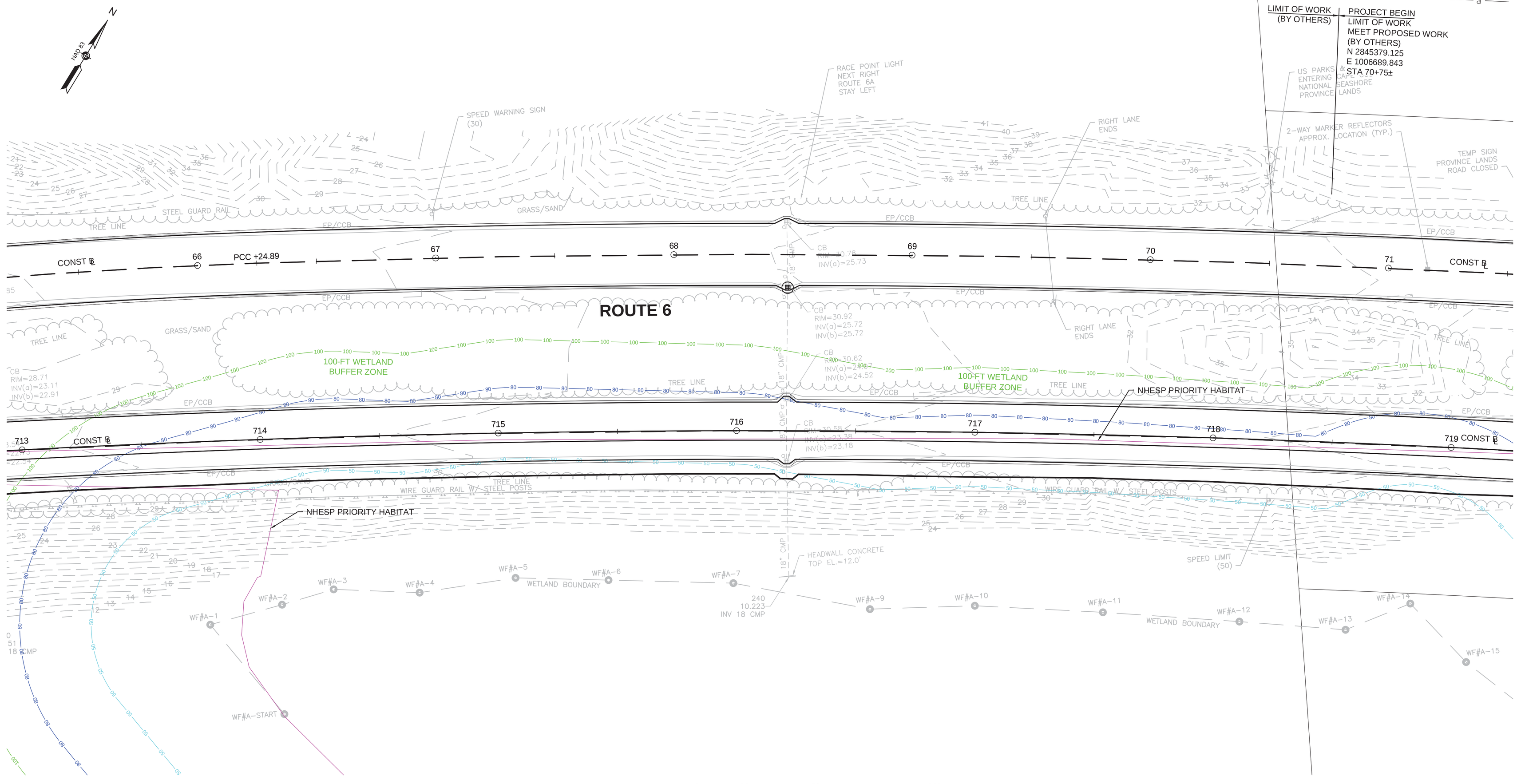
NONE

DRAINAGE DETAILS

BY OTHERS

NOTES:

1. ALL STATIONS AND OFFSETS ARE MEASURED AT THE CENTER OF STRUCTURES.
2. ALL RIM AND INVERT INFORMATION IS BASED OFF TOPOGRAPHIC SURVEY. CONTRACTOR TO FIELD VERIFY ALL INFORMATION AND REPORT ANY INCONSISTENCIES TO THE ENGINEER FOR RESOLUTION.
3. SANITARY STRUCTURES (SMH) BOLTED OR SEALED SHUT SHALL BE REPORTED TO THE TOWN PRIOR TO REMOVING THE COVERS AS NEEDED TO PERFORM ADJACENT ROADWAY WORK.
4. ALL DRAINAGE STRUCTURES AND PIPES PROPOSED TO BE RETAINED AND/OR UTILIZED WITHIN THE PROJECT LIMITS AND AS DIRECTED BY THE ENGINEER SHALL BE CLEANED OF ALL SEDIMENT AND DEBRIS TO THE SATISFACTION OF THE ENGINEER.



608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:34 PM
Proposal No. 608744-136412

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

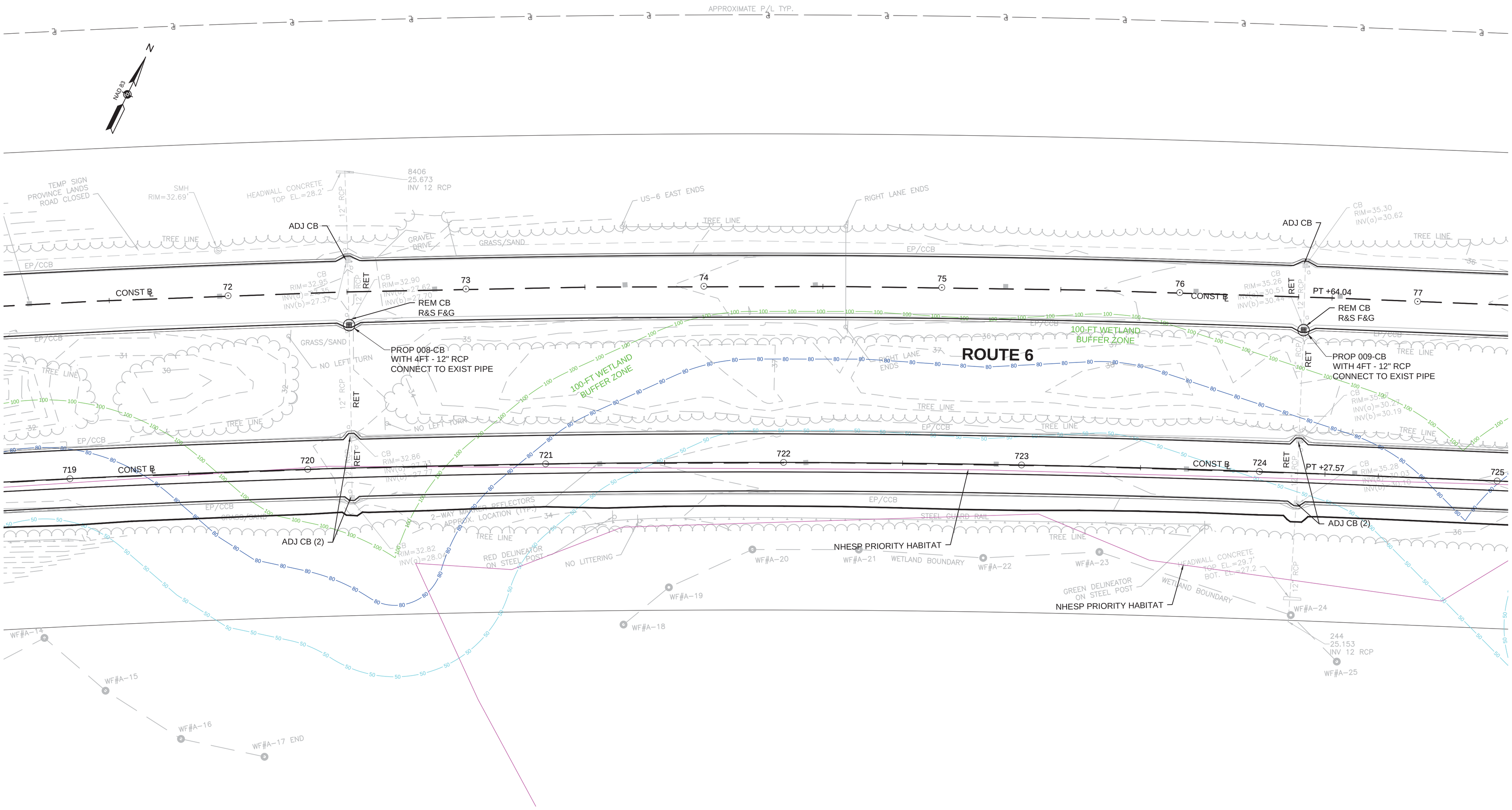
NOTES:

1. ALL STATIONS AND OFFSETS ARE MEASURED AT THE CENTER OF STRUCTURES.
2. ALL RIM AND INVERT INFORMATION IS BASED OFF TOPOGRAPHIC SURVEY. CONTRACTOR TO FIELD VERIFY ALL INFORMATION AND REPORT ANY INCONSISTENCIES TO THE ENGINEER FOR RESOLUTION.
3. SANITARY STRUCTURES (SMH) BOLTED OR SEALED SHUT SHALL BE REPORTED TO THE TOWN PRIOR TO REMOVING THE COVERS AS NEEDED TO PERFORM ADJACENT ROADWAY WORK.
4. ALL DRAINAGE STRUCTURES AND PIPES PROPOSED TO BE RETAINED AND/OR UTILIZED WITHIN THE PROJECT LIMITS AND AS DIRECTED BY THE ENGINEER SHALL BE CLEANED OF ALL SEDIMENT AND DEBRIS TO THE SATISFACTION OF THE ENGINEER.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	134	206
PROJECT FILE NO.	608744		

UTILITY PLANS - 05



608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:35 PM
Proposal No. 608744-1-1-1

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

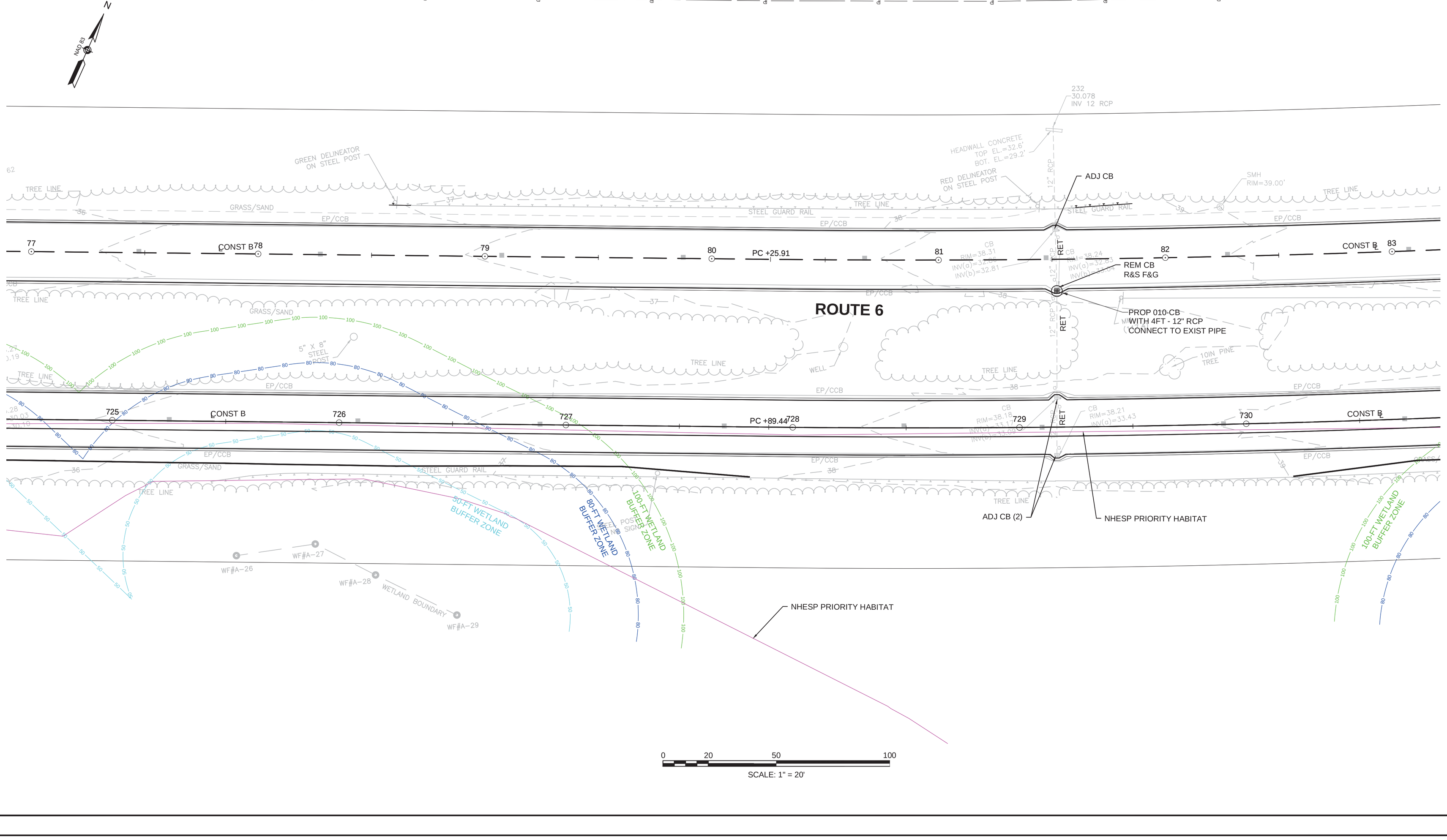
NOTES:

1. ALL STATIONS AND OFFSETS ARE MEASURED AT THE CENTER OF STRUCTURES.
2. ALL RIM AND INVERT INFORMATION IS BASED OFF TOPOGRAPHIC SURVEY. CONTRACTOR TO FIELD VERIFY ALL INFORMATION AND REPORT ANY INCONSISTENCIES TO THE ENGINEER FOR RESOLUTION.
3. SANITARY STRUCTURES (SMH) BOLTED OR SEALED SHUT SHALL BE REPORTED TO THE TOWN PRIOR TO REMOVING THE COVERS AS NEEDED TO PERFORM ADJACENT ROADWAY WORK.
4. ALL DRAINAGE STRUCTURES AND PIPES PROPOSED TO BE RETAINED AND/OR UTILIZED WITHIN THE PROJECT LIMITS AND AS DIRECTED BY THE ENGINEER SHALL BE CLEANED OF ALL SEDIMENT AND DEBRIS TO THE SATISFACTION OF THE ENGINEER.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	135	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 06



608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:35 PM
Proposal No. 608744-136412
A00800 - 196

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

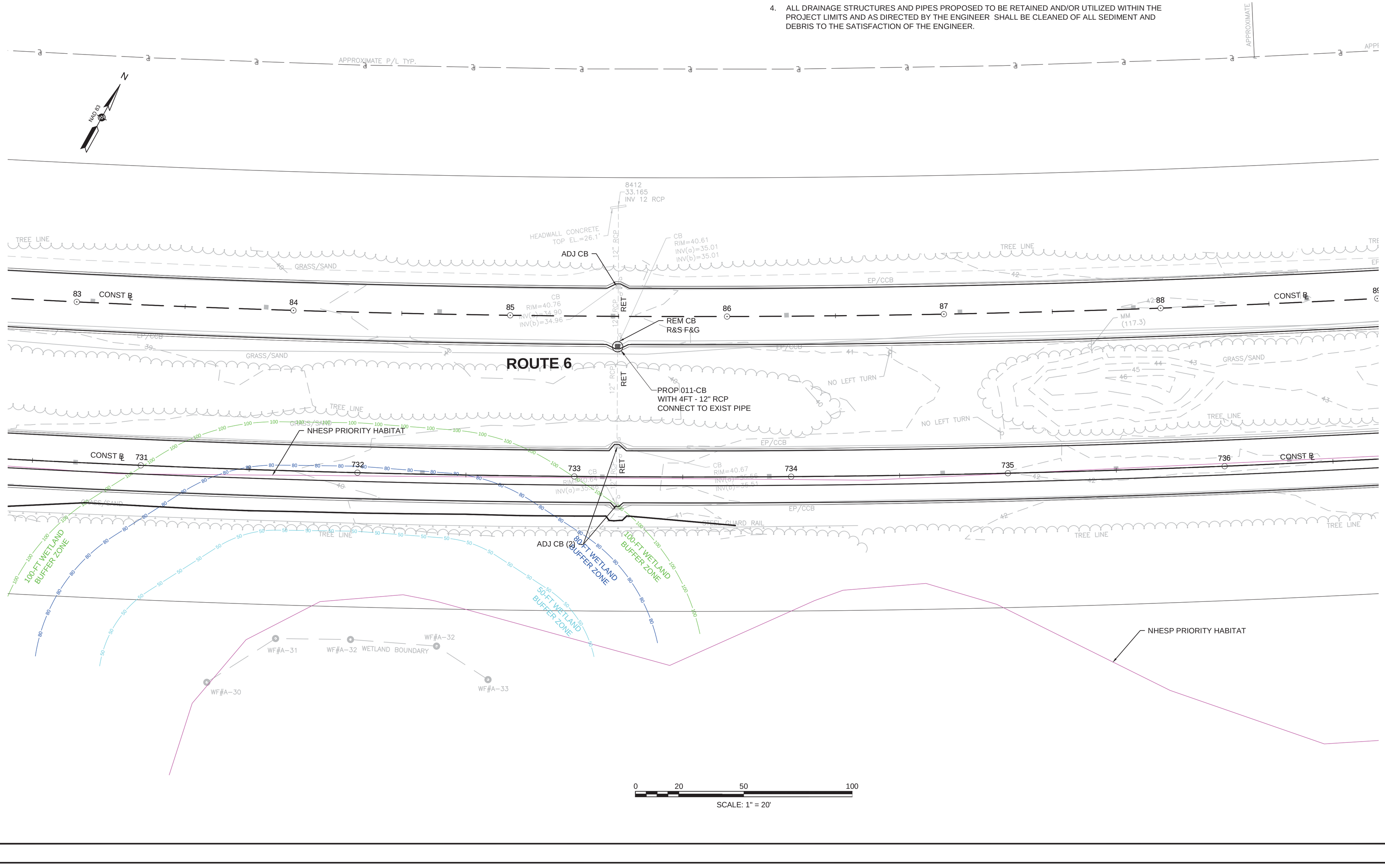
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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	136	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 07



608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:35 PM

Proposal No. 608744-136412

A080869 - 197

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	137	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 08

608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:36 PM

Proposal No. 608744-136412

AM88069 - 198

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

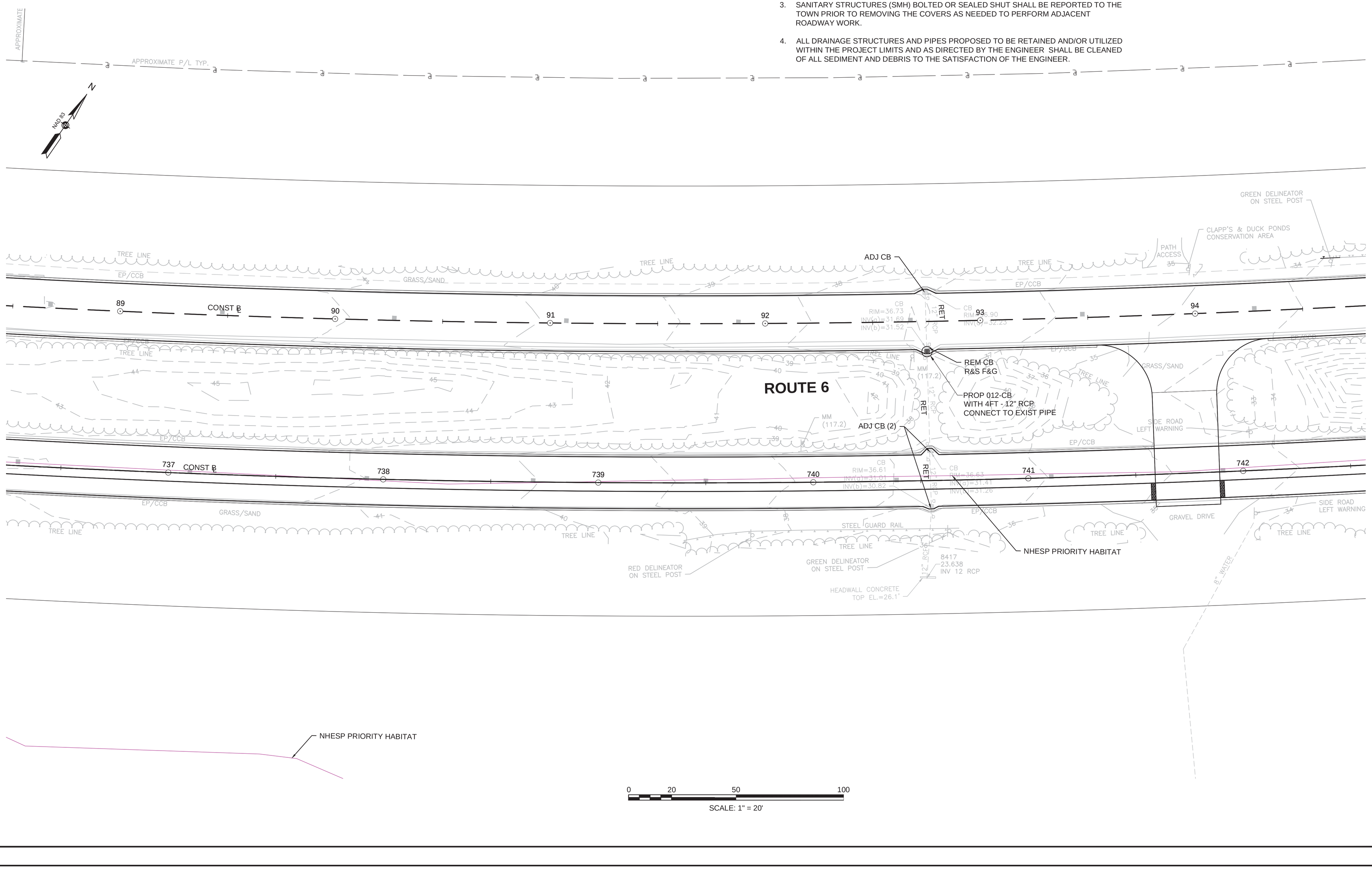
NONE

DRAINAGE DETAILS

SEE BELOW

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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	138	280
PROJECT FILE NO.	608744		

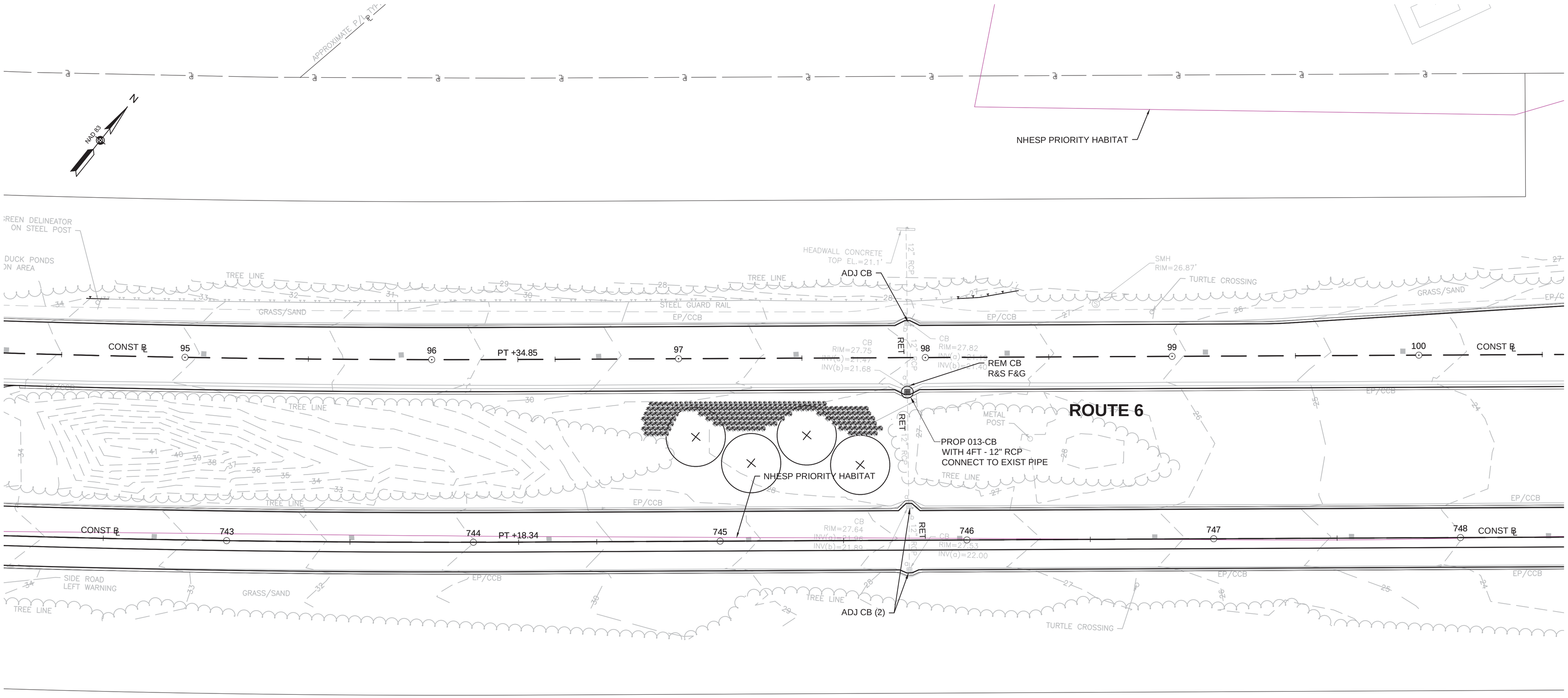
UTILITY PLANS - 09

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE BELOW



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0 20 50 100
SCALE: 1" = 20'

608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:36 PM
Proposal No. 608744-136412
AV00980 - 199

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	139	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 10

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

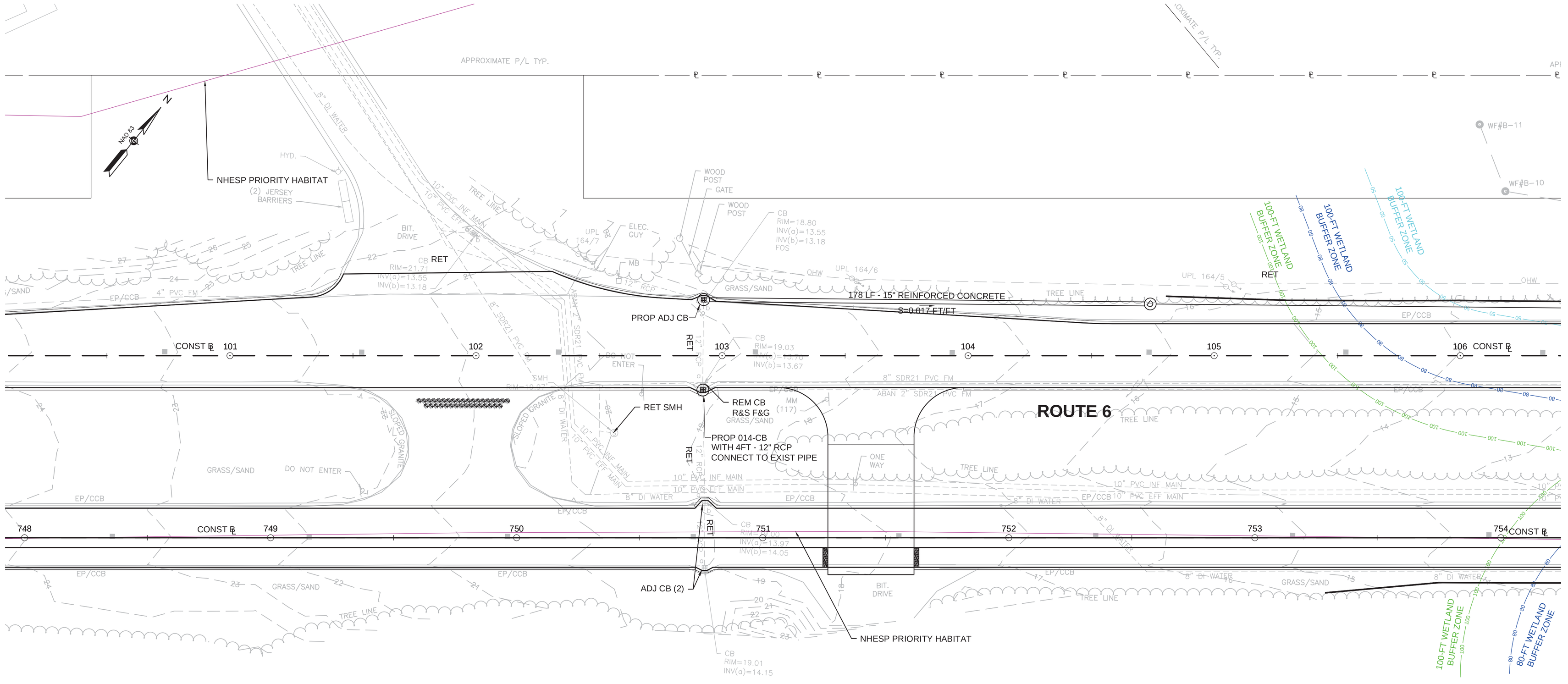
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW



NOTES:

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0 20 50 100

SCALE: 1" = 20'

608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:36 PM
Proposal No. 608744-136412
AW8860 - 200

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

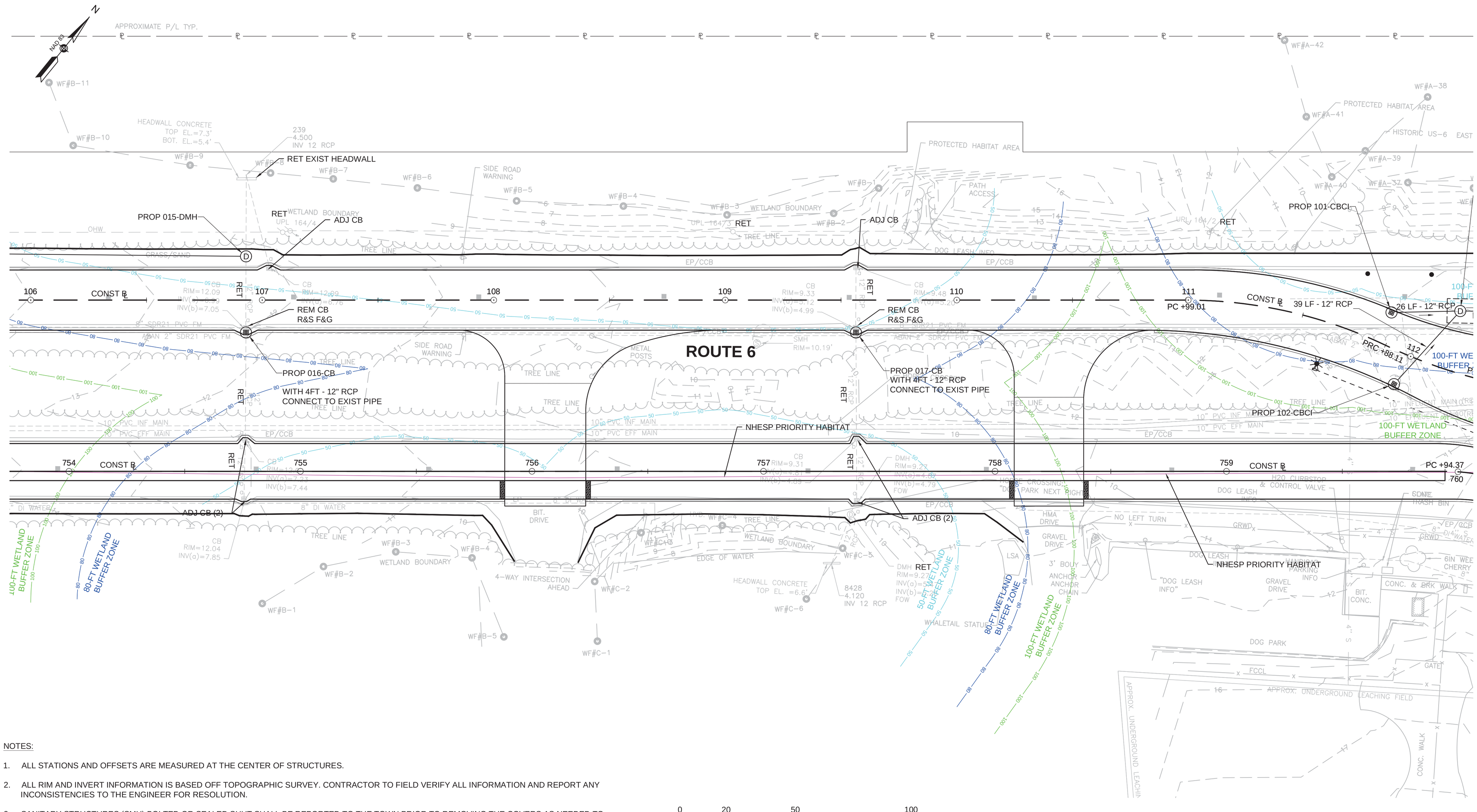
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	140	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 11

608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:37 PM

Proposal No. 608744-136412

AM8860 - 201



NOTES:

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0 20 50 100

SCALE: 1" = 20'

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	STREET LIGHTING DETAILS
NONE	NONE	NONE	SEE BELOW	SEE SHEET XX

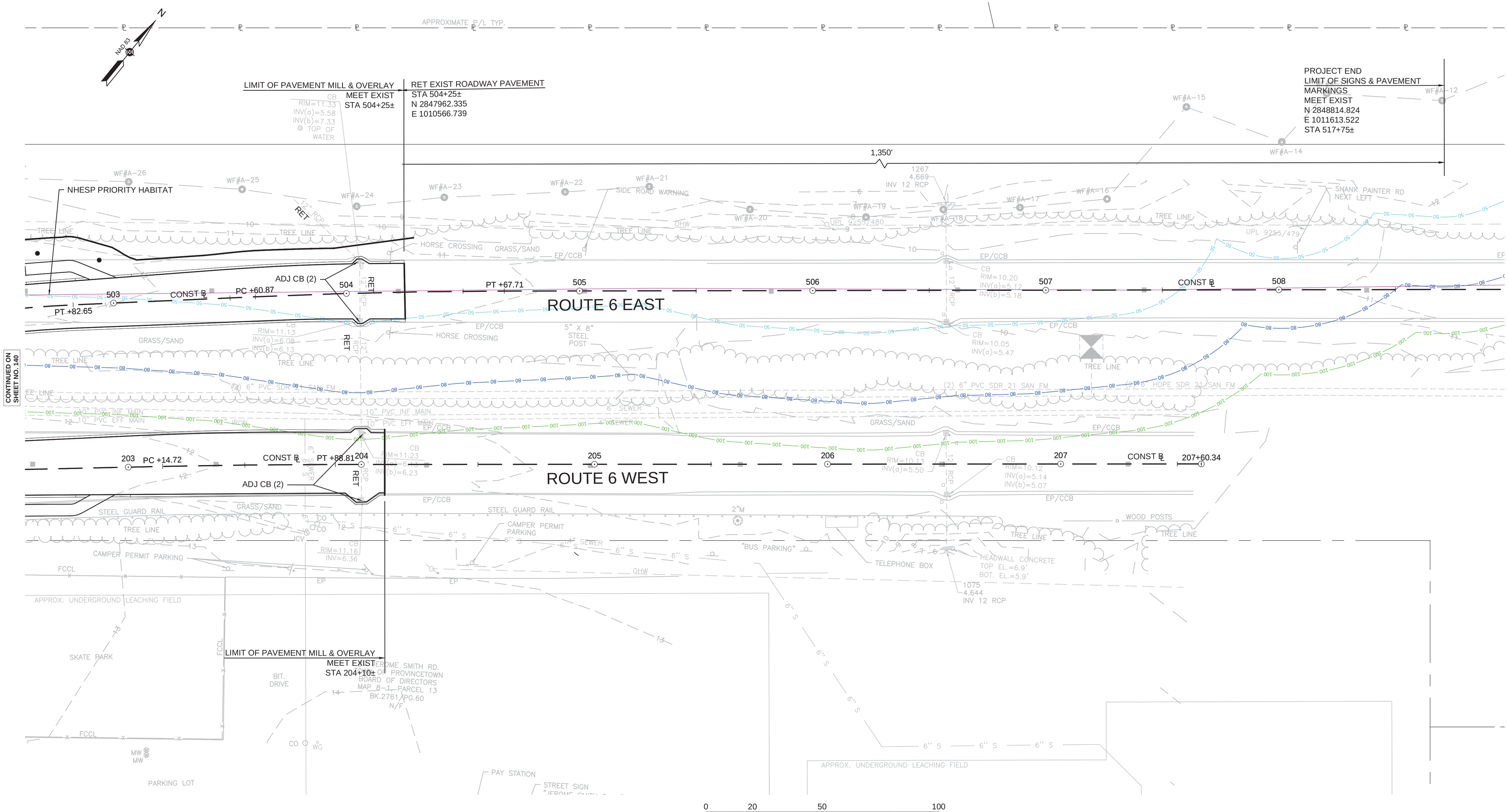
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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	141	280
PROJECT FILE NO.		608744	

UTILITY PLANS - 13



608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:37 PM
Proposal No. 608744-136412
A00860 - 202

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	STREET LIGHTING DETAILS
NONE	NONE	NONE	SEE BELOW	SEE SHEET XX

NOTES:

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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

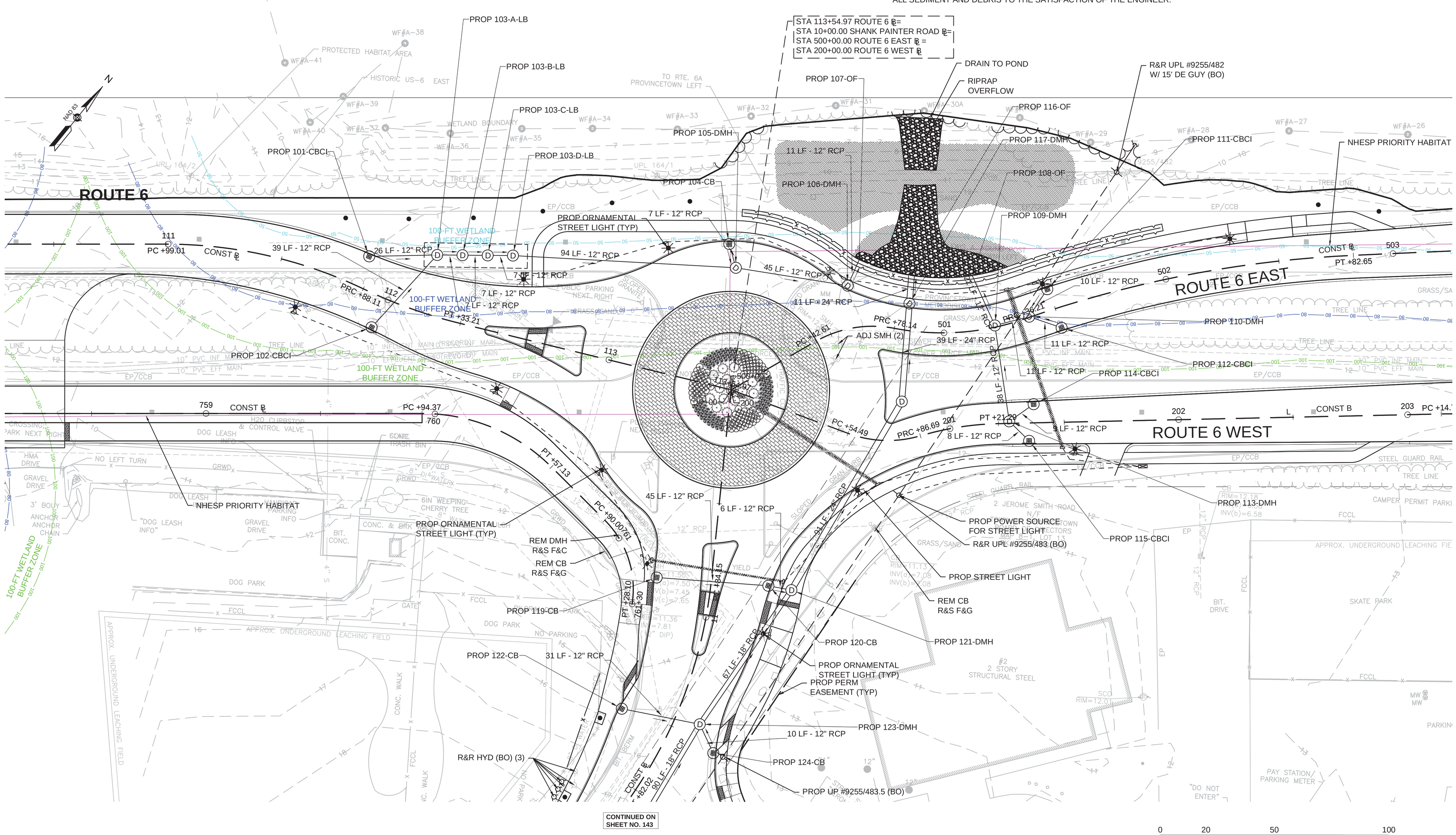
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	142	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 12

608744_UT(RTE6).DWG Plotted on 31-Jul-2025 3:37 PM

Proposal No. 608744-136412

A008969 - 203



PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	143	280
PROJECT FILE NO.		608744	

UTILITY PLANS - 14

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

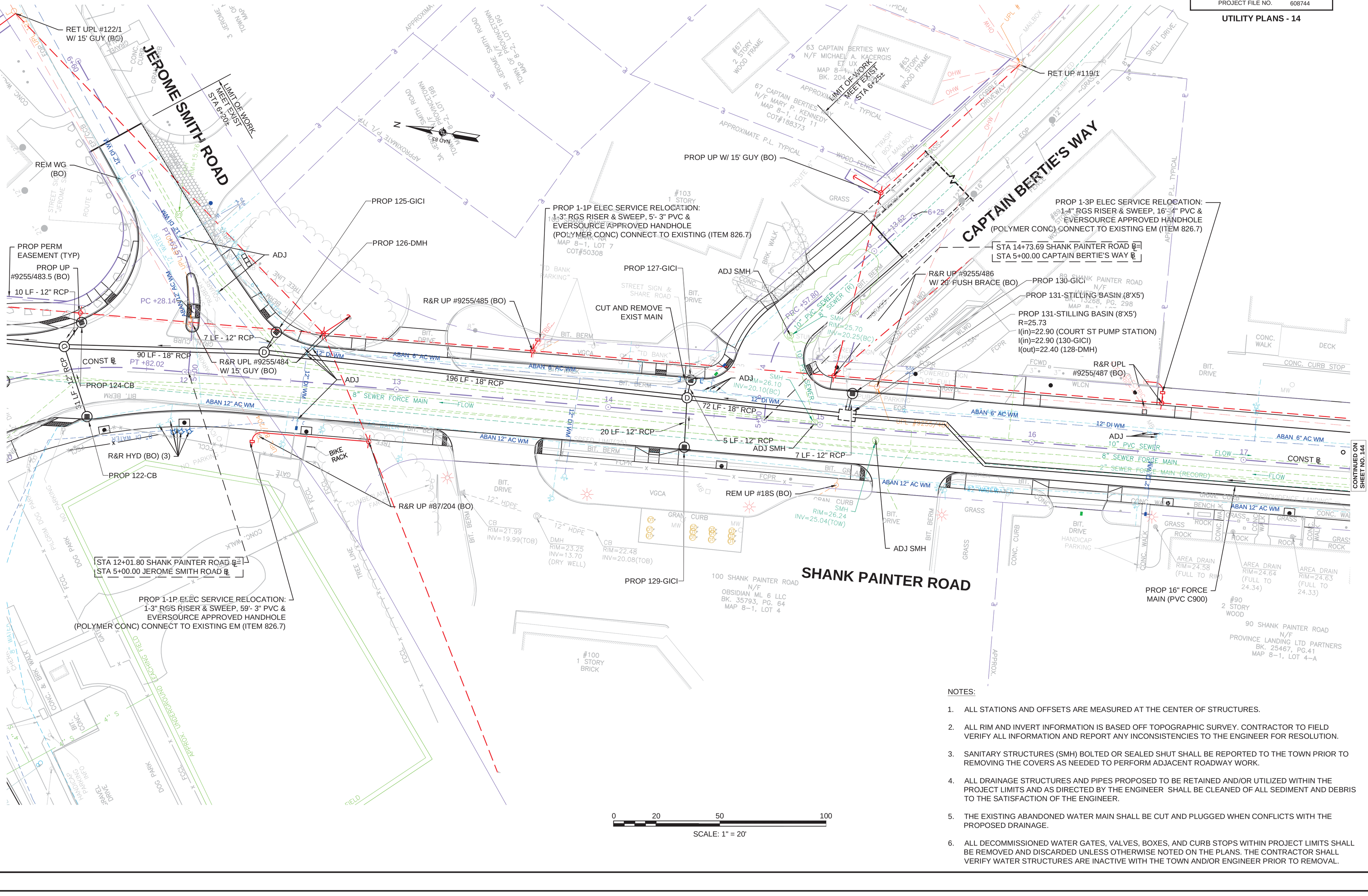
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW



0 20 50 100

SCALE: 1" = 20'

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5. THE EXISTING ABANDONED WATER MAIN SHALL BE CUT AND PLUGGED WHEN CONFLICTS WITH THE PROPOSED DRAINAGE.
6. ALL DECOMMISSIONED WATER GATES, VALVES, BOXES, AND CURB STOPS WITHIN PROJECT LIMITS SHALL BE REMOVED AND DISCARDED UNLESS OTHERWISE NOTED ON THE PLANS. THE CONTRACTOR SHALL VERIFY WATER STRUCTURES ARE INACTIVE WITH THE TOWN AND/OR ENGINEER PRIOR TO REMOVAL.

608744_UTI(SHANK).DWG Plotted on 31-Jul-2025 3:39 PM
Proposal No. 608744-136412
AW8969 - 204

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

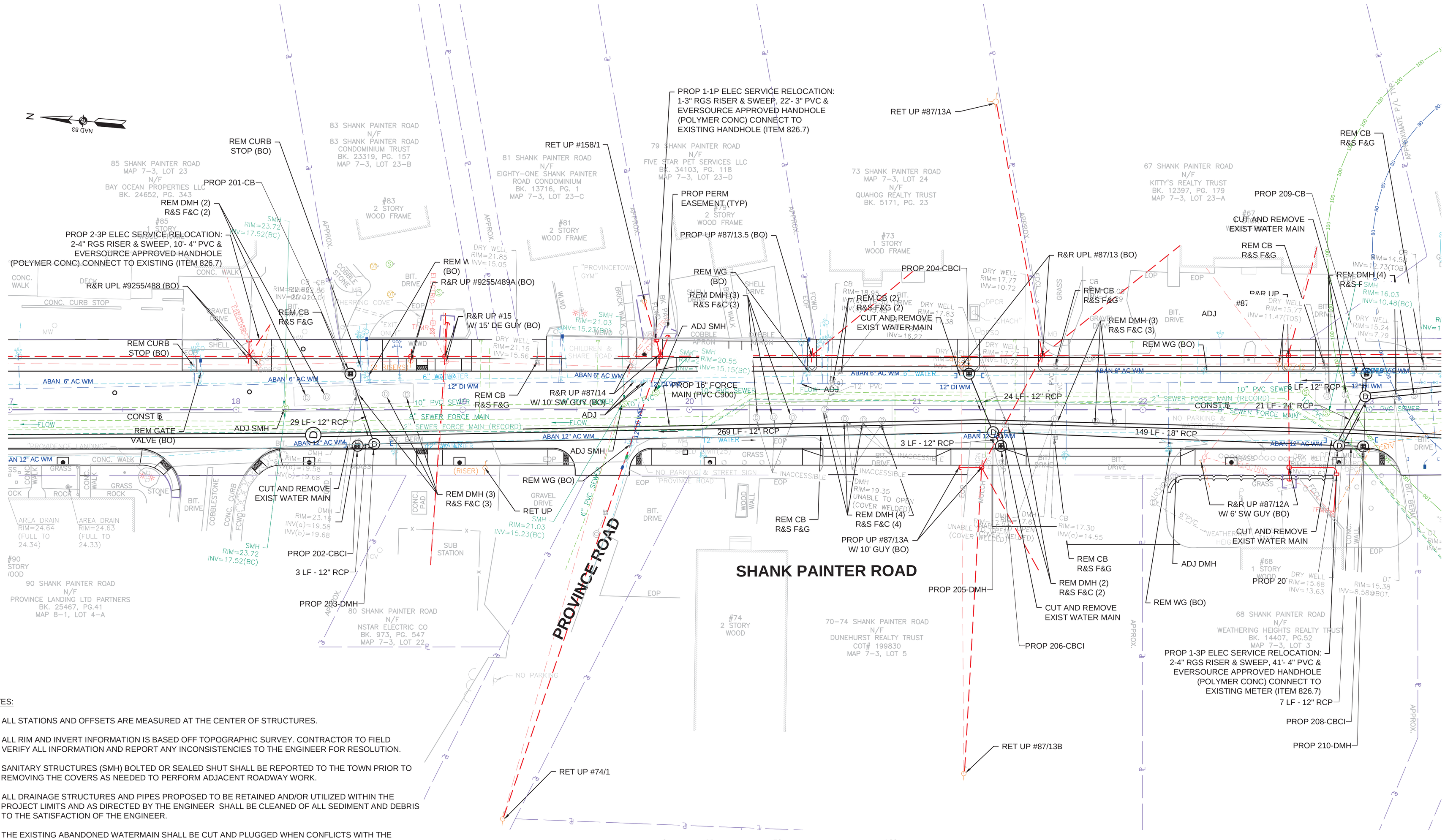
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW



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608744_UT(SHANK).DWG Plotted on 31-Jul-2025 3:40 PM
A00860 - 705
Proposal No. 608744-136412

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	145	280
PROJECT FILE NO.		608744	

UTILITY PLANS - 16

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

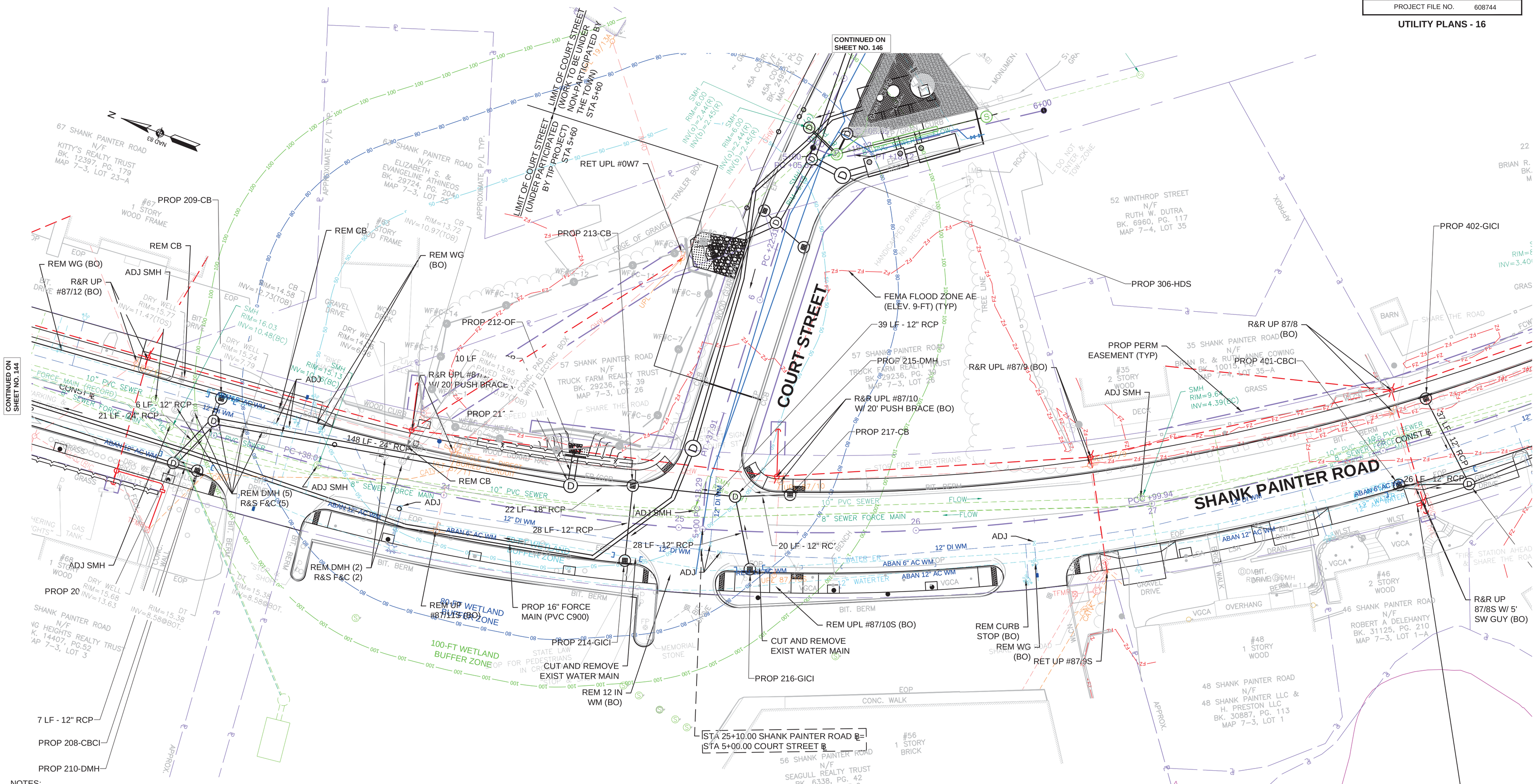
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW



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608744_UTI(SHANK).DWG Plotted on 31-Jul-2025 3:40 PM
Proposal No. 608744-136412
AW8069 - 206

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

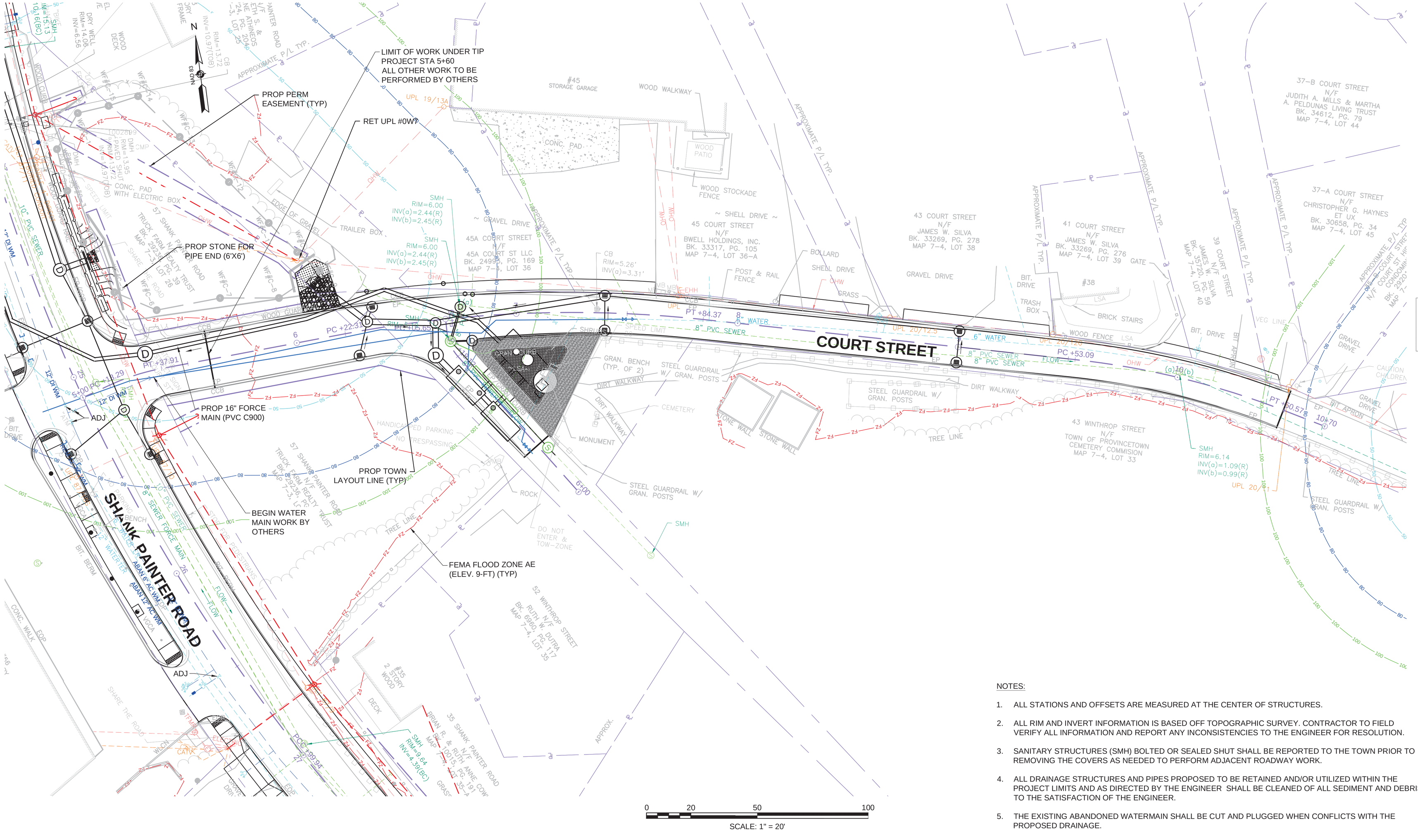
DRAINAGE DETAILS

SEE BELOW

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	146	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 17



CONTINUED ON SHEET NO. 145

CONTINUED ON SHEET NO. 147

NOTES:

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608744_UT(SHANK).DWG Plotted on 31-Jul-2025 3:41 PM
Proposal No. 608744-136412
A008660 - 207

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

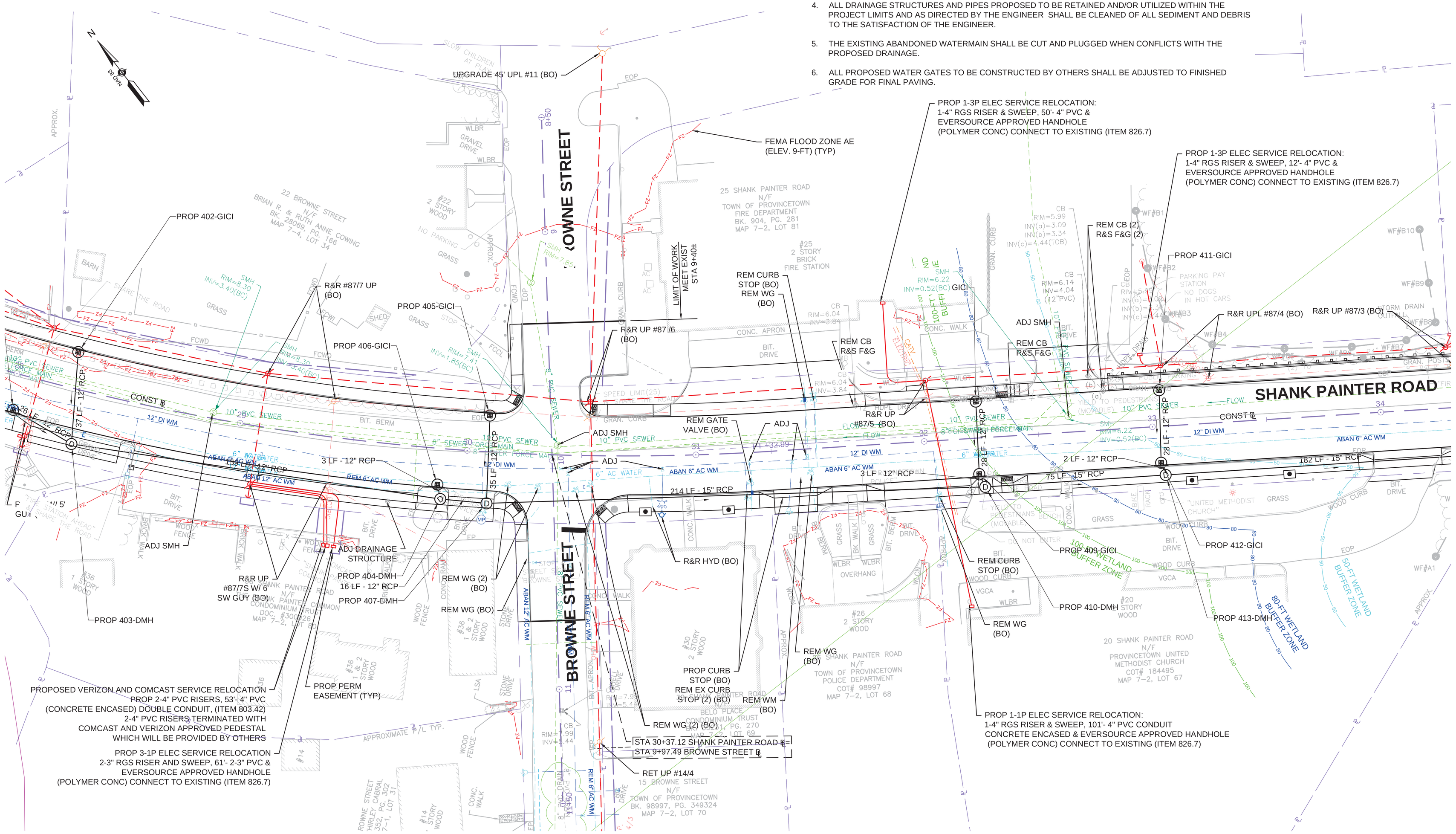
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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	--	147	280
PROJECT FILE NO.	608744		

UTILITY PLANS - 18



608744_UT(SHANK).DWG Plotted on 31-Jul-2025 3:41 PM
Proposal No. 608744-11641-2
AW8809 - 208

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

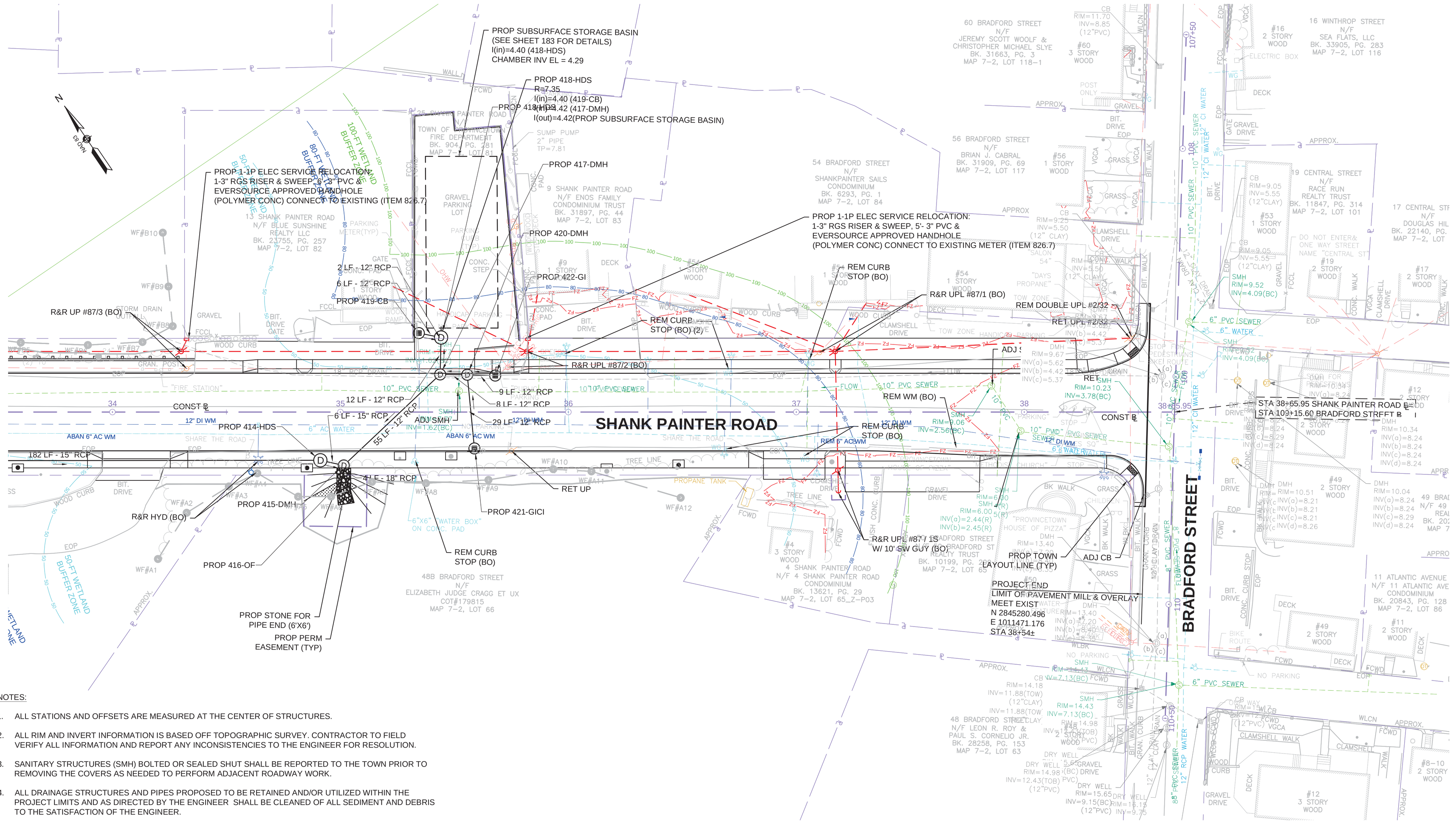
DRAINAGE DETAILS

SEE BELOW

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	148	280
PROJECT FILE NO.		608744	

UTILITY PLANS - 19



608744_UT(SHANK).DWG Plotted on 31-Jul-2025 3:41 PM
Proposal No. 608744-13612
A00860 - 709

NOTES:

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7. ALL PROPOSED WORK WITHIN HATCHED AREA TO BE PERFORMED BY OTHERS.

DRAINAGE STRUCTURE TABLE

NAME/TYPE	ALIGNMENT	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
001-CB	ROUTE 6 COMBINED	56+91.99	14.1 LT	21.51			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
002-CB	ROUTE 6 COMBINED	60+81.11	12.0 LT	25.88	I=20.31' (004-DMH)		CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
003-CB	ROUTE 6 COMBINED	60+81.35	12.0 RT	25.68		I=21.51' (005-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
004-DMH	ROUTE 6 COMBINED	60+94.67	18.7 LT	26.71		I=21.52' (002-CB) I=22.31' (005-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
005-DMH	ROUTE 6 COMBINED	60+91.75	4.3 RT	25.49	I=21.27' (003-CB) I=21.08' (004-DMH)		CONCENTRIC CYLINDRICAL STRUCTURE
006-CB	ROUTE 6 COMBINED	64+95.35	14.0 RT	28.87			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
007-CB	ROUTE 6 COMBINED	68+47.81	14.0 RT	30.92			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
008-CB	ROUTE 6 COMBINED	72+50.48	14.0 RT	32.79			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
009-CB	ROUTE 6 COMBINED	76+52.61	14.0 RT	35.27			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
010-CB	ROUTE 6 COMBINED	81+52.02	14.0 RT	38.21			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
011-CB	ROUTE 6 COMBINED	85+49.62	14.0 RT	40.60			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
012-CB	ROUTE 6 COMBINED	92+75	14.0 RT	36.72			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
013-CB	ROUTE 6 COMBINED	97+92.65	14.0 RT	27.90			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
014-CB	ROUTE 6 COMBINED	102+92.17	14.0 RT	19.05			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
015-DMH	ROUTE 6 COMBINED	106+92.98	18.9 LT	12.16	I=7.94' (016-DMH)		CONCENTRIC CYLINDRICAL STRUCTURE
016-CB	ROUTE 6 COMBINED	106+92.96	14.0 RT	12.13			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
016-DMH	???	???	??? ???	16.18	I=11.58' (ADJ CB)	I=11.58' (015-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
017-CB	ROUTE 6 COMBINED	109+56.44	14.0 RT	9.47			CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
ADJ CB	ROUTE 6 COMBINED	102+92.52	22.8 LT	18.76		I=14.59' (016-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME

DRAINAGE STRUCTURE TABLE

NAME/TYPE	ALIGNMENT	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
101-CBCI	ROUTE 6 COMBINED	111+84.60	13.9 LT	10.81		I=7.80' (103-A-LB)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
102-CBCI	ROUTE 6 COMBINED	111+98.03	13.8 RT	10.99		I=7.80' (103-A-LB)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
103-A-LB	ROUTE 6 COMBINED	112+13.98	25.9 LT	10.81	I=7.60' (102-CBCI) I=7.60' (101-CBCI)	I=7.50' (103-B-LB)	CONCENTRIC CYLINDRICAL STRUCTURE
103-B-LB	ROUTE 6 COMBINED	112+26.09	29.1 LT	10.77	I=7.50' (103-A-LB)	I=7.50' (103-C-LB)	CONCENTRIC CYLINDRICAL STRUCTURE
103-C-LB	ROUTE 6 COMBINED	112+37.73	31.7 LT	10.79	I=7.50' (103-B-LB)	I=7.50' (103-D-LB)	CONCENTRIC CYLINDRICAL STRUCTURE
103-D-LB	ROUTE 6 COMBINED	112+48.46	34.3 LT	11.56	I=7.50' (103-C-LB)	I=7.50' (105-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
104-CB	ROUTE 6 COMBINED	113+39.03	61.7 LT	12.79		I=7.30' (105-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
105-DMH	ROUTE 6 COMBINED	113+44.29	52.3 LT	13.00	I=7.20' (104-CB) I=6.50' (103-D-LB)	I=7.83' (106-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
106-DMH	ROUTE 6 EASTBOUND	500+60.66	18.6 LT	13.42	I=7.25' (105-DMH)	I=7.15' (107-OF)	CONCENTRIC CYLINDRICAL STRUCTURE
107-OF	ROUTE 6 EASTBOUND	500+64.92	29.3 LT	8.77	I=7.10' (106-DMH)		CONCRETE RECTANGULAR HEADWALL
108-OF	ROUTE 6 EASTBOUND	501+16.03	24.1 LT	8.77	I=7.10' (109-DMH)		CONCRETE RECTANGULAR HEADWALL
109-DMH	ROUTE 6 EASTBOUND	501+22.55	0.8 LT	12.17	I=8.60' (113-DMH) I=8.60' (110-DMH)	I=7.30' (108-OF)	CONCENTRIC CYLINDRICAL STRUCTURE
110-DMH	ROUTE 6 EASTBOUND	501+38.07	0.3 LT	12.08	I=8.80' (111-CBCI) I=8.80' (112-CBCI)	I=8.70' (109-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
111-CBCI	ROUTE 6 EASTBOUND	501+49.26	9.2 LT	11.87		I=9.00' (110-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
112-CBCI	ROUTE 6 EASTBOUND	501+50.10	8.8 RT	11.88		I=9.00' (110-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
113-DMH	ROUTE 6 WESTBOUND	201+26.02	0.9 LT	12.50	I=9.20' (114-CBCI) I=9.20' (115-CBCI)	I=9.10' (109-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
114-CBCI	ROUTE 6 WESTBOUND	201+36.83	8.2 LT	12.32		I=9.40' (113-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
115-CBCI	ROUTE 6 WESTBOUND	201+34.52	7.8 RT	12.33		I=9.40' (113-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME

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DRAINAGE STRUCTURE TABLE							
NAME/TYPE	ALIGNMENT	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
116-OF	ROUTE 6 EASTBOUND	500+82	24.3 LT	9.85	I=7.10' (117-DMH)		CONCRETE RECTANGULAR HEADWALL
117-DMH	ROUTE 6 EASTBOUND	500+83.12	11.8 LT	13.02	I=8.50' (118-DMH)	I=7.30' (116-OF)	CONCENTRIC CYLINDRICAL STRUCTURE
118-DMH	ROUTE 6 EASTBOUND	500+85.37	31.1 RT	13.10	I=8.80' (121-DMH)	I=8.70' (117-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
119-CB	SHANK PAINTER	10+85.01	23.9 RT	12.72		I=10.55' (120-CB)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
120-CB	SHANK PAINTER	10+83.46	25.1 LT	12.70	I=10.34' (119-CB)	I=10.24' (121-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
121-DMH	SHANK PAINTER	10+84.30	35.2 LT	13.31	I=10.20' (120-CB) I=9.30' (123-DMH)	I=9.20' (118-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
122-CB	SHANK PAINTER	11+52.47	22.8 RT	14.70		I=11.94' (123-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
123-DMH	SHANK PAINTER	11+44.39	11.0 LT	14.54	I=11.00' (124-CB) I=11.80' (122-CB) I=10.50' (126-DMH)	I=10.40' (121-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
124-CB	SHANK PAINTER	11+52.77	21.6 LT	14.74		I=11.10' (123-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
125-GICI	SHANK PAINTER	12+41.48	22.2 LT	19.16		I=16.50' (126-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
126-DMH	SHANK PAINTER	12+36.53	12.4 LT	19.11	I=15.90' (128-DMH) I=16.46' (125-GICI)	I=13.30' (123-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
127-GICI	SHANK PAINTER	14+37.75	15.9 LT	24.66		I=22.23' (128-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
128-DMH	SHANK PAINTER	14+36.59	7.5 LT	24.80	I=21.70' (131-STILLING BASIN (8'X5')) I=22.20' (127-GICI) I=22.20' (129-GICI)	I=21.60' (126-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
129-GICI	SHANK PAINTER	14+37.24	15.8 RT	24.65		I=22.29' (128-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
130-GICI	SHANK PAINTER	15+14.07	15.9 LT	25.53		I=23.10' (131-STILLING BASIN (8'X5'))	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
131-STILLING BASIN (8'X5')	SHANK PAINTER	15+12.40	5.4 LT	25.73	I=22.90' (130-GICI)	I=22.40' (128-DMH)	8'X5' STILLING BASIN STRUCTURE

DRAINAGE STRUCTURE TABLE							
NAME/TYPE	ALIGNMENT	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
201-CB	SHANK PAINTER	18+50.43	15.9 LT	22.35		I=19.30' (203-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
202-CBCI	SHANK PAINTER	18+53.62	15.9 RT	22.29		I=18.80' (203-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
203-DMH	SHANK PAINTER	18+60.94	15.1 RT	22.16	I=19.10' (201-CB) I=18.60' (202-CBCI)	I=16.99' (205-DMH)	DMH WITH 4' DEEP SUMP
204-CBCI	SHANK PAINTER	21+23.34	15.9 LT	17.72		I=15.20' (205-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
205-DMH	SHANK PAINTER	21+33.94	9.9 RT	17.67	I=10.16' (203-DMH) I=12.00' (206-CBCI) I=15.00' (204-CBCI)	I=10.06' (207-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
206-CBCI	SHANK PAINTER	21+37.43	16.0 RT	17.50		I=12.07' (205-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
207-DMH	SHANK PAINTER	22+86.55	15.8 RT	15.19	I=7.10' (205-DMH) I=8.00' (208-CBCI)	I=7.00' (210-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
208-CBCI	SHANK PAINTER	22+97.18	16.2 RT	15.02		I=8.17' (207-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
209-CB	SHANK PAINTER	22+98.65	15.9 LT	15.00		I=11.20' (210-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
210-DMH	SHANK PAINTER	22+98.12	5.9 LT	15.43	I=11.10' (209-CB) I=6.85' (207-DMH)	I=6.75' (211-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
211-DMH	SHANK PAINTER	24+52.41	12.8 LT	12.68	I=6.25' (213-CB) I=6.25' (210-DMH)	I=6.15' (212-OF)	HYDRODYNAMIC SEPARATOR
212-OF	SHANK PAINTER	24+52.69	25.3 LT	8.75	I=6.05' (211-DMH)		9.25'W X 5'H PRECAST CONCRETE HEADWALL
213-CB	SHANK PAINTER	24+78.93	15.8 LT	12.21	I=9.20' (214-GICI) I=7.22' (215-DMH)	I=6.50' (211-DMH)	DMH WITH GRATE
214-GICI	SHANK PAINTER	24+78.77	15.9 RT	12.21		I=10.20' (213-CB)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
215-DMH	SHANK PAINTER	25+23.09	14.4 LT	11.56	I=8.80' (216-GICI) I=8.80' (217-CB)	I=8.00' (213-CB)	DMH WITH 4' DEEP SUMP
216-GICI	SHANK PAINTER	25+30.56	15.9 RT	11.42		I=9.50' (215-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME

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A008860 - 211

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	151	280
PROJECT FILE NO.	608744		

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608744_UT(SHANK).DWG Plotted on 31-Jul-2025 3:43 PM

DRAINAGE STRUCTURE TABLE							
NAME/TYPE	ALIGNMENT	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
217-CB	SHANK PAINTER	25+46.68	15.9 LT	11.19		I=9.00' (215-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
301-OVERFLOW-INLET	COURT	6+13.44	25.4 LT	6.85		I=2.00' (303-DMH)	COURT STREET WETLAND OVERFLOW STRUCTURE
302-CBCI	COURT	6+36.17	9.9 LT	6.52		I=3.91' (303-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
303-DMH	COURT	6+32.96	3.6 LT	6.75	I=1.29' (301-OVERFLOW-INLET) I=4.03' (304-CBCI) I=3.79' (302-CBCI)	I=1.19' (305-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
304-CBCI	COURT	6+26.85	10.8 RT	7.01		I=4.15' (303-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
305-DMH	COURT	6+63.26	1.3 RT	6.14	I=0.55' (303-DMH) I=-0.89' (307-CBCI)	I=-0.99' (306-HDS)	CONCENTRIC CYLINDRICAL STRUCTURE
306-HDS	COURT	6+61.72	15.8 RT	6.24	I=-1.14' (305-DMH)	I=-1.24' ()	CONCENTRIC CYLINDRICAL STRUCTURE
307-CBCI	COURT	7+39.75	7.8 LT	5.42	I=-0.02' (308-CBCI) I=2.05' (309-CBCI)	I=-0.12' (305-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
308-CBCI	COURT	7+40.03	7.9 RT	5.42		I=0.14' (307-CBCI)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
309-CBCI	COURT	8+99.90	7.2 LT	7.08	I=2.64' (310-CBCI)	I=2.21' (307-CBCI)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
310-CBCI	COURT	8+99.97	7.1 RT	5.85		I=2.78' (309-CBCI)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME

DRAINAGE STRUCTURE TABLE							
NAME/TYPE	ALIGNMENT	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
401-CBCI	SHANK PAINTER	28+02.58	15.7 RT	9.01		I=6.35' (403-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
402-GICI	SHANK PAINTER	28+23.72	15.9 LT	8.87		I=6.35' (403-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
403-DMH	SHANK PAINTER	28+30.41	23.8 RT	9.28	I=6.15' (402-GICI) I=6.15' (401-CBCI)	I=6.05' (404-DMH)	DEEP SUMP MH
404-DMH	SHANK PAINTER	29+89.95	22.0 RT	8.32	I=5.22' (403-DMH) I=5.17' (406-GICI)	I=5.17' (407-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
405-GICI	SHANK PAINTER	30+09.02	15.9 LT	7.65		I=5.24' (407-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
406-GICI	SHANK PAINTER	29+88.20	15.8 RT	7.79		I=5.22' (404-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
407-DMH	SHANK PAINTER	30+09.76	22.5 RT	8.13	I=5.11' (405-GICI) I=5.08' (404-DMH)	I=5.08' (410-DMH)	
408-GICI	SHANK PAINTER	32+23.64	15.9 LT	6.61		I=4.36' (409-GICI)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
409-GICI	SHANK PAINTER	32+23.13	15.8 RT	6.62	I=4.23' (408-GICI)	I=4.23' (410-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
410-DMH	SHANK PAINTER	32+25.40	21.5 RT	7.15	I=4.20' (407-DMH) I=4.20' (409-GICI)	I=4.20' (413-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
411-GICI	SHANK PAINTER	33+03.93	15.8 LT	6.51		I=4.29' (412-GICI)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
412-GICI	SHANK PAINTER	33+02.80	15.9 RT	6.50	I=3.97' (411-GICI)	I=3.97' (413-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
413-DMH	SHANK PAINTER	33+04.43	21.3 RT	7.04	I=3.90' (410-DMH) I=3.90' (412-GICI)	I=3.90' (414-HDS)	CONCENTRIC CYLINDRICAL STRUCTURE
414-HDS	SHANK PAINTER	34+91.20	21.2 RT	7.60	I=3.13' (413-DMH)	I=3.13' (415-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
415-DMH	SHANK PAINTER	35+01.46	23.4 RT	7.46	I=4.48' (417-DMH) I=3.08' (414-HDS)	I=3.08' (416-OF)	CONCENTRIC CYLINDRICAL STRUCTURE
416-OF	SHANK PAINTER	35+01.55	29.1 RT	4.79	I=3.00' (415-DMH)		CONCRETE FLARED END SECTION

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Proposal No. 608744-136412

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	152	280
PROJECT FILE NO.	608744		

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NOTES:

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DRAINAGE STRUCTURE TABLE

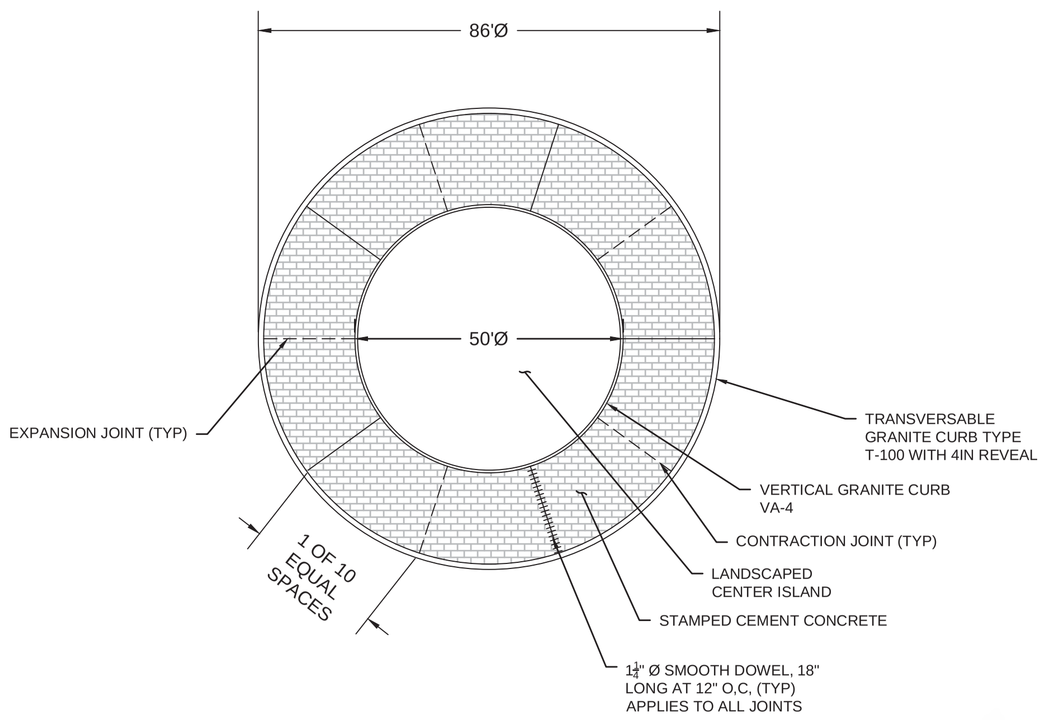
NAME/TYPE	ALIGNMENT	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
417-DMH	SHANK PAINTER	35+43.75	16.5 LT	7.09	I=4.48' (420-DMH)	I=4.48' (418-HDS) I=4.72' (415-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE
418-HDS	SHANK PAINTER	35+44.15	32.7 LT	7.36	I=4.40' (419-CB) I=4.42' (417-DMH)	I=4.42' ()	CONCENTRIC CYLINDRICAL STRUCTURE
419-CB	SHANK PAINTER	35+34.41	34.6 LT	7.27		I=4.44' (418-HDS)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
420-DMH	SHANK PAINTER	35+55.65	16.4 LT	7.16	I=4.53' (422-GI) I=4.53' (421-GICI)	I=4.53' (417-DMH)	DMH WITH 4' DEEP SUMP
421-GICI	SHANK PAINTER	35+58.78	16.0 RT	7.18		I=4.66' (420-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME
422-GI	SHANK PAINTER	35+67.93	16.0 LT	7.23		I=4.58' (420-DMH)	CONCENTRIC CYLINDRICAL STRUCTURE RECTANGULAR FRAME

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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

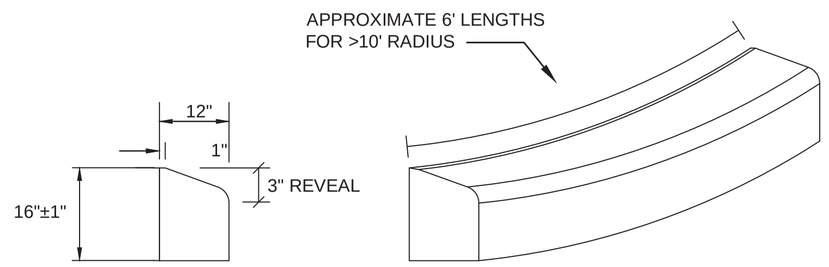
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	161	280
PROJECT FILE NO.	608744		

CONSTRUCTION DETAILS - 01



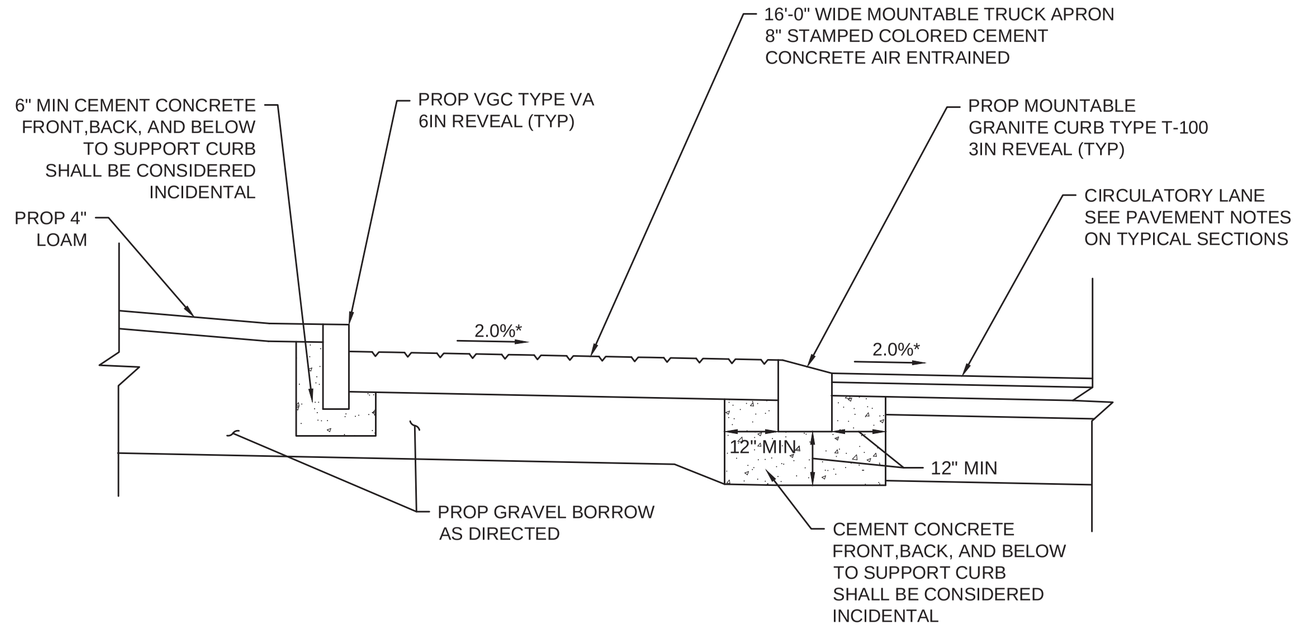
MOUNTABLE TRUCK APRON

N.T.S.



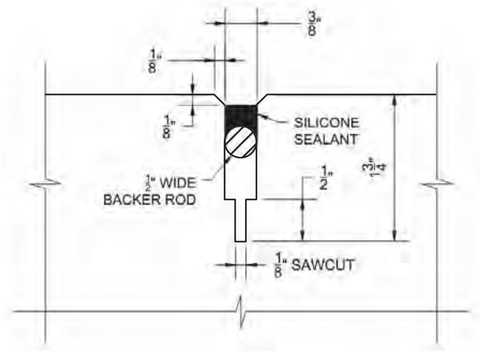
GRANITE CURB-TRANSVERABLE TYPE-100 (CURVED)

N.T.S



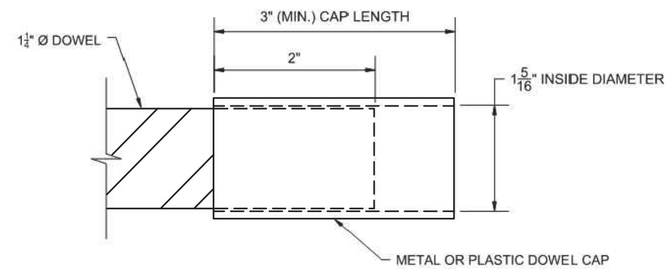
BULLNOSE STAMPED CONCRETE TRUCK APRON DETAIL

N.T.S.



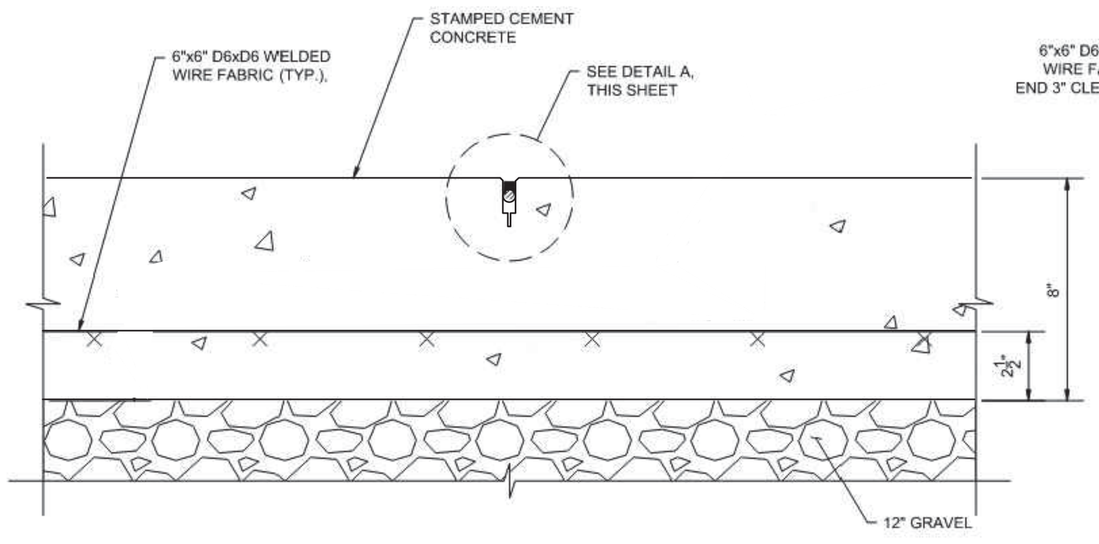
DETAIL A

N.T.S.



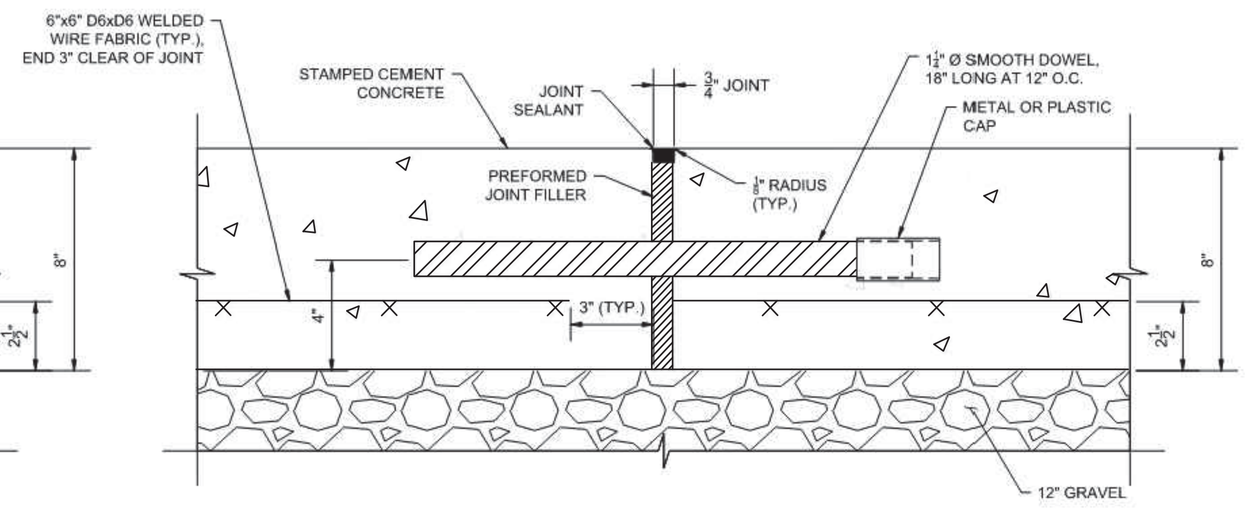
DOWEL BAR CAP DETAIL

N.T.S.



TRUCK APRON CONTRACTION JOINT

N.T.S.

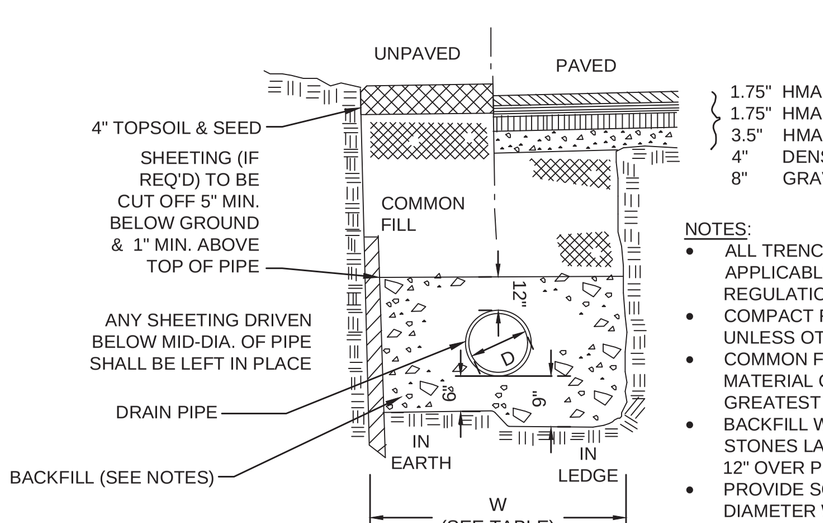


TRUCK APRON EXPANSION JOINT

N.T.S.

608744_HD(CONST_DETAILS).DWG Plotted on 1-May-2025 12:05 PM
Proposal No: 608744-136412
A008669 - 214

608744_HD(CONST_DETAILS).DWG Plotted on 1-May-2025 12:05 PM
Proposal No. 608744-136412
AM0860 - 215



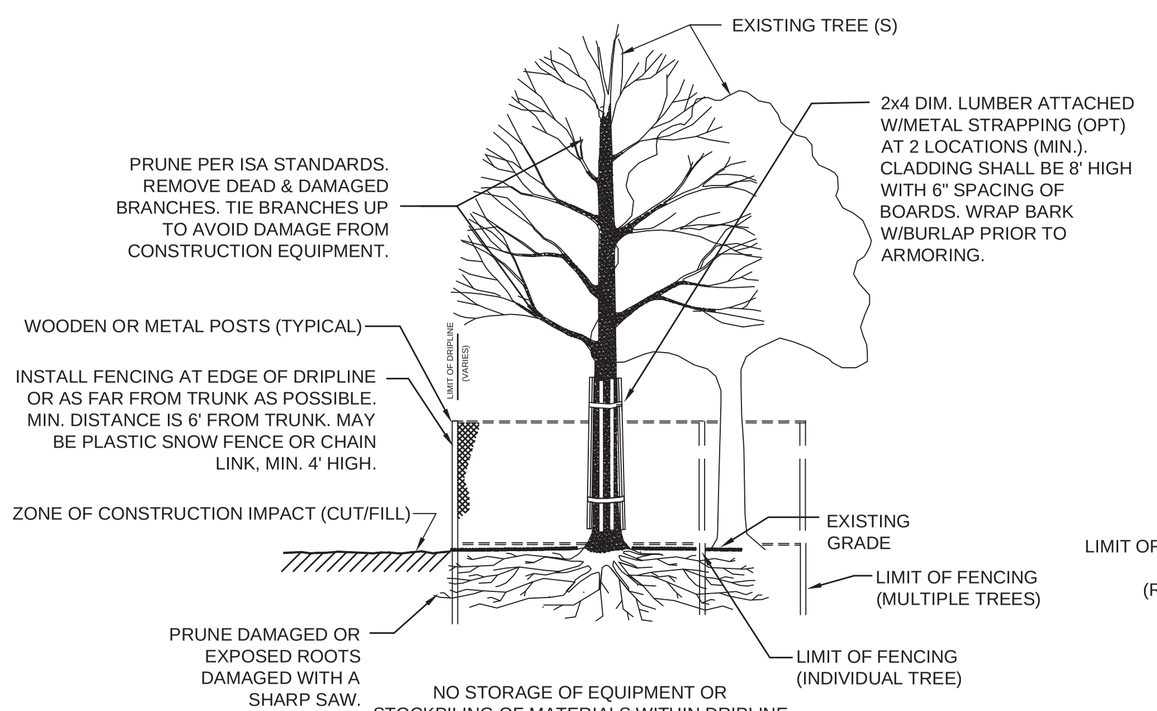
1.75" HMA TOP COURSE
1.75" HMA BINDER COURSE
3.5" HMA BASE COURSE
4" DENSE GRADE CRUSHED STONE
8" GRAVEL BORROW TYPE B (OR SUITABLE SUBBASE)

TRENCH WIDTH		
D DIAMETER OF PIPE	W UNSHEETED	W SHEETED
TO 12"	3'	4'
14" TO 24"	4'	5'
30" TO 36"	5'	6'

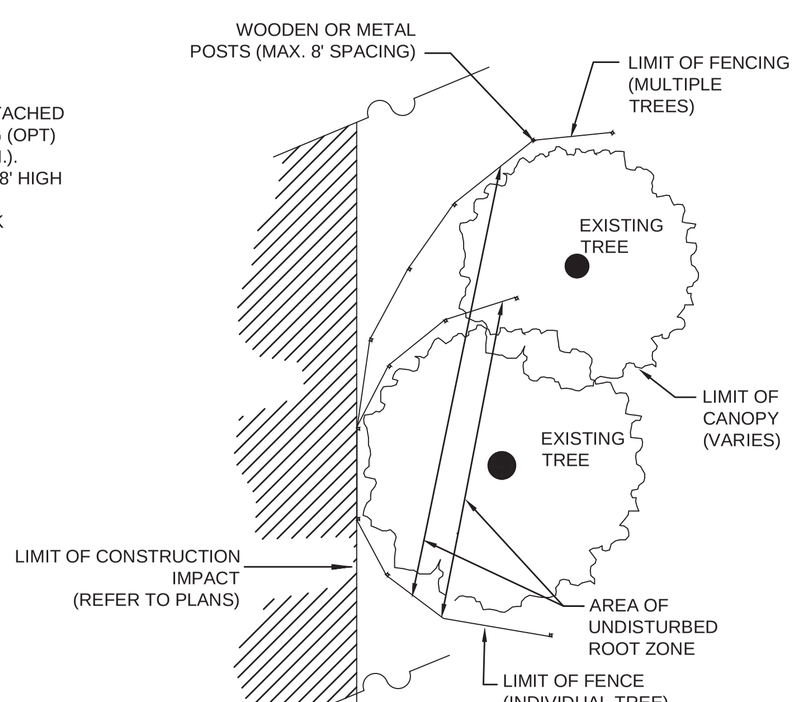
NOTES:

- ALL TRENCH CONSTRUCTION TO CONFORM TO APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
- COMPACT FILL AND TAMP PIPE TO 95% MAX. DENSITY UNLESS OTHERWISE SPECIFIED.
- COMMON FILL MATERIAL TO CONSIST OF GRANULAR MATERIAL CONTAINING NO STONES LARGER THAN 6" IN GREATEST DIMENSION.
- BACKFILL WITH SELECT MATERIAL CONTAINING NO STONES LARGER THAN 3" IN GREATEST DIMENSION TO 12" OVER PIPE FOR SEWER AND DRAIN PIPES.
- PROVIDE SCREENED GRAVEL BEDDING TO MID PIPE DIAMETER WHERE GROUNDWATER IS ENCOUNTERED AS DIRECTED BY THE ENGINEER.
- REMOVE UNSUITABLE MATERIAL BELOW GRADE IF ENCOUNTERED, TO SUITABLE DEPTHS AS DIRECTED BY ENGINEER AND REPLACE WITH CLEAN GRANULAR FILL.
- PAYMENT FOR HMA TRENCH PATCHING SHALL BE PAID FOR UNDER ITEM 472. HMA FOR MISCELLANEOUS WORK.

PERMANENT TRENCH PATCH
N.T.S

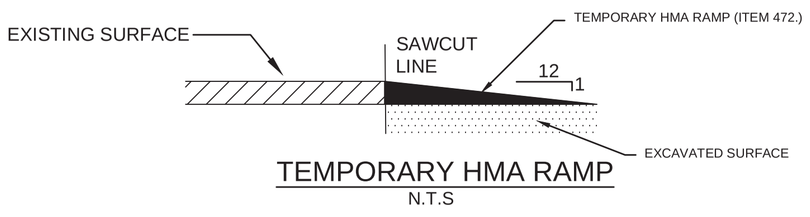


SECTION VIEW

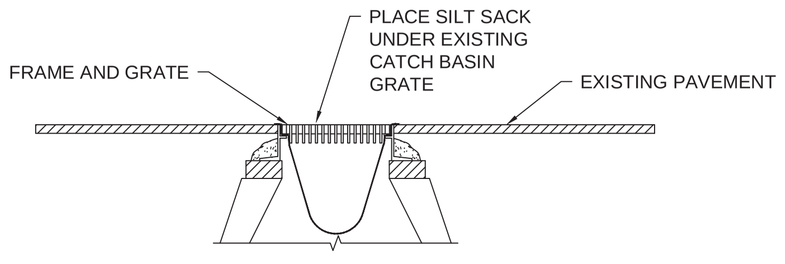


PLAN VIEW

TREE PROTECTION DETAIL
N.T.S



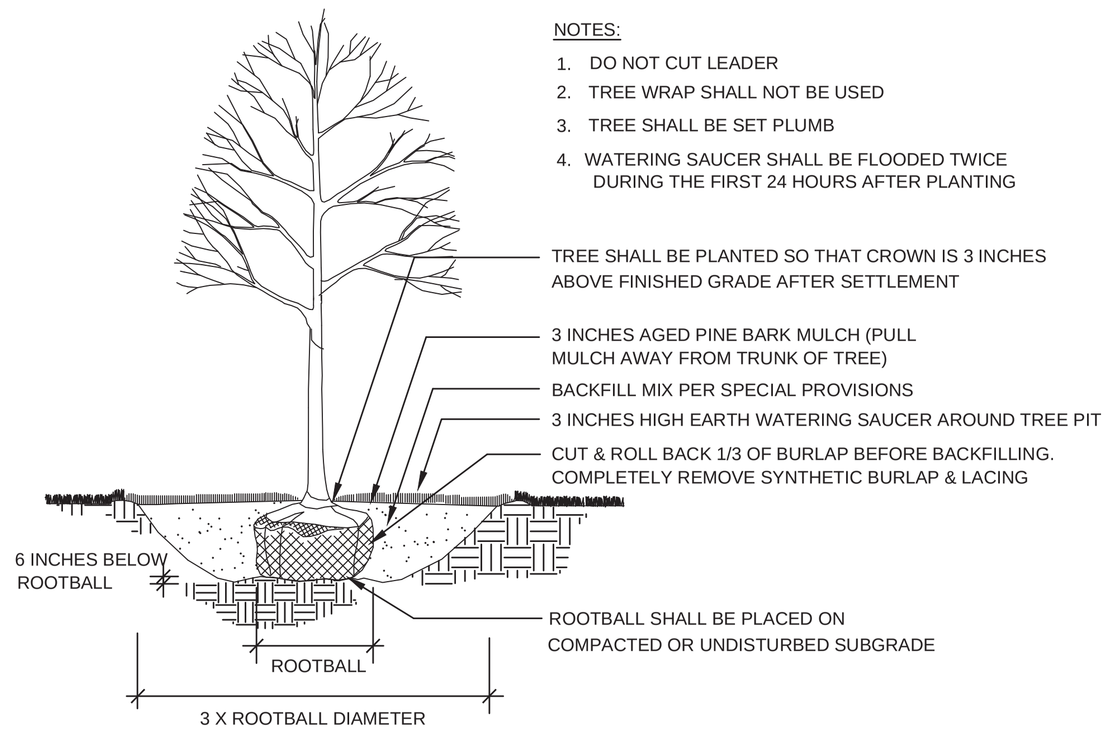
TEMPORARY HMA RAMP
N.T.S



NOTES:

1. SILT SACKS SHALL BE INSPECTED WEEKLY AND ACCUMULATED SILT REMOVED TO ALLOW CATCH BASIN TO FUNCTION PROPERLY.
2. HIGH CAPACITY SILT SACK AS MANUFACTURED BY ACF ENVIRONMENTAL OR APPROVED EQUAL.

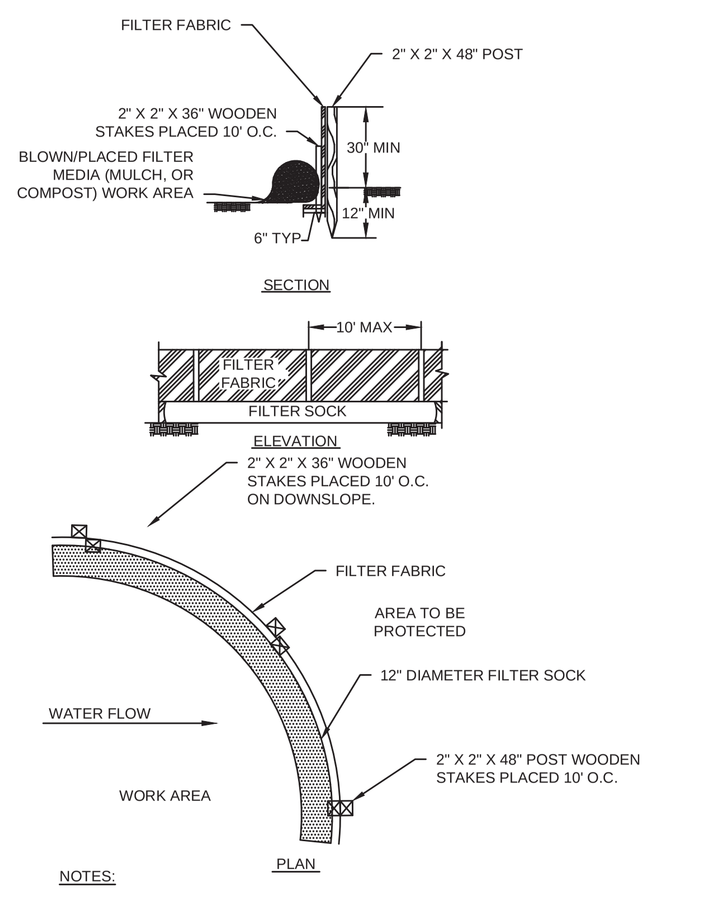
SEDIMENTATION CONTROL AT CATCH BASINS SILT SACKS
SCALE: N.T.S.



NOTES:

1. DO NOT CUT LEADER
2. TREE WRAP SHALL NOT BE USED
3. TREE SHALL BE SET PLUMB
4. WATERING SAUCER SHALL BE FLOODED TWICE DURING THE FIRST 24 HOURS AFTER PLANTING

DECIDUOUS TREE PLANTING
N.T.S

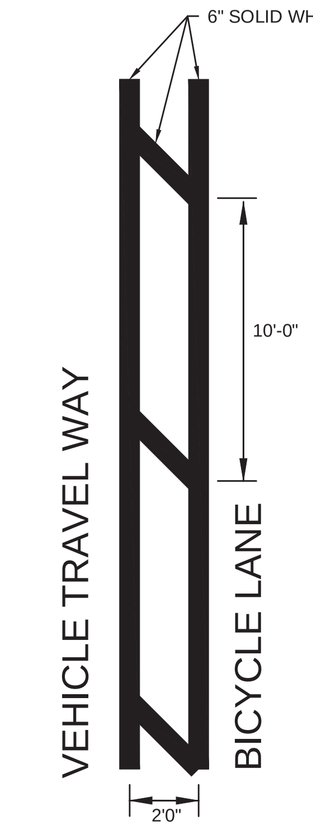


NOTES:

1. FABRIC TO BE ATTACHED TO STAKES WITH STAPLES.
2. FABRIC TO BE UV RESISTANT POLYPROPYLENE WITH A MIN. WEIGHT OF 2.5 OZ./S.Y.
3. USE SILT FENCE WITH FILTER SOCK WHERE INDICATED, OR AS DIRECTED BY THE ENGINEER.

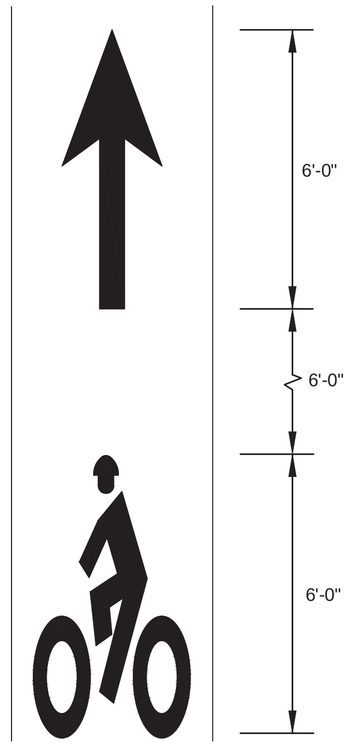
12" DIAMETER SEDIMENTATION BARRIER
N.T.S

608744_HD(CONST_DETAILS).DWG Plotted on 1-May-2025 12:06 PM
Proposal No. 608744-136412
A008660 - 216



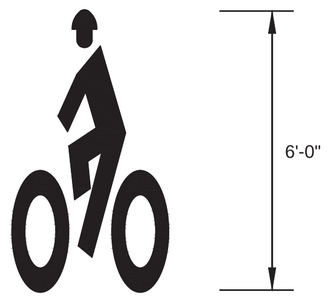
2' BICYCLE BUFFER

N.T.S



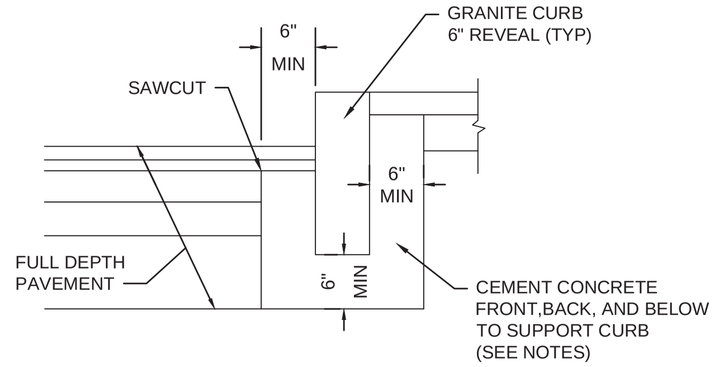
BICYCLE LANE MARKINGS

N.T.S



BICYCLE LANE MARKINGS (MOD)

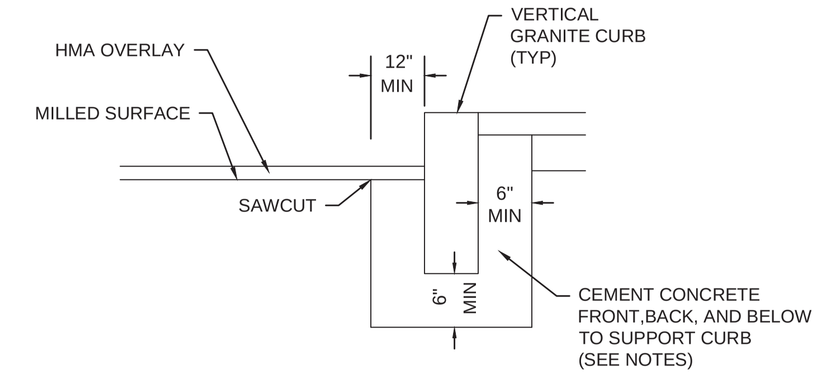
N.T.S



NOTES:
1. CONCRETE AND SAWCUT SHALL BE INCLUDED IN PRICE BID FOR GRANITE CURB
2. SAWCUT 12" FROM EXISTING EDGE OF PAVEMENT FOR FULL DEPTH BOX WIDENING AND SAWCUT 6" FROM CURB LINE IF BINDER COURSE IS PLACED PRIOR TO CURB SETTING.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

GRANITE CURB IN FULL DEPTH PAVEMENT

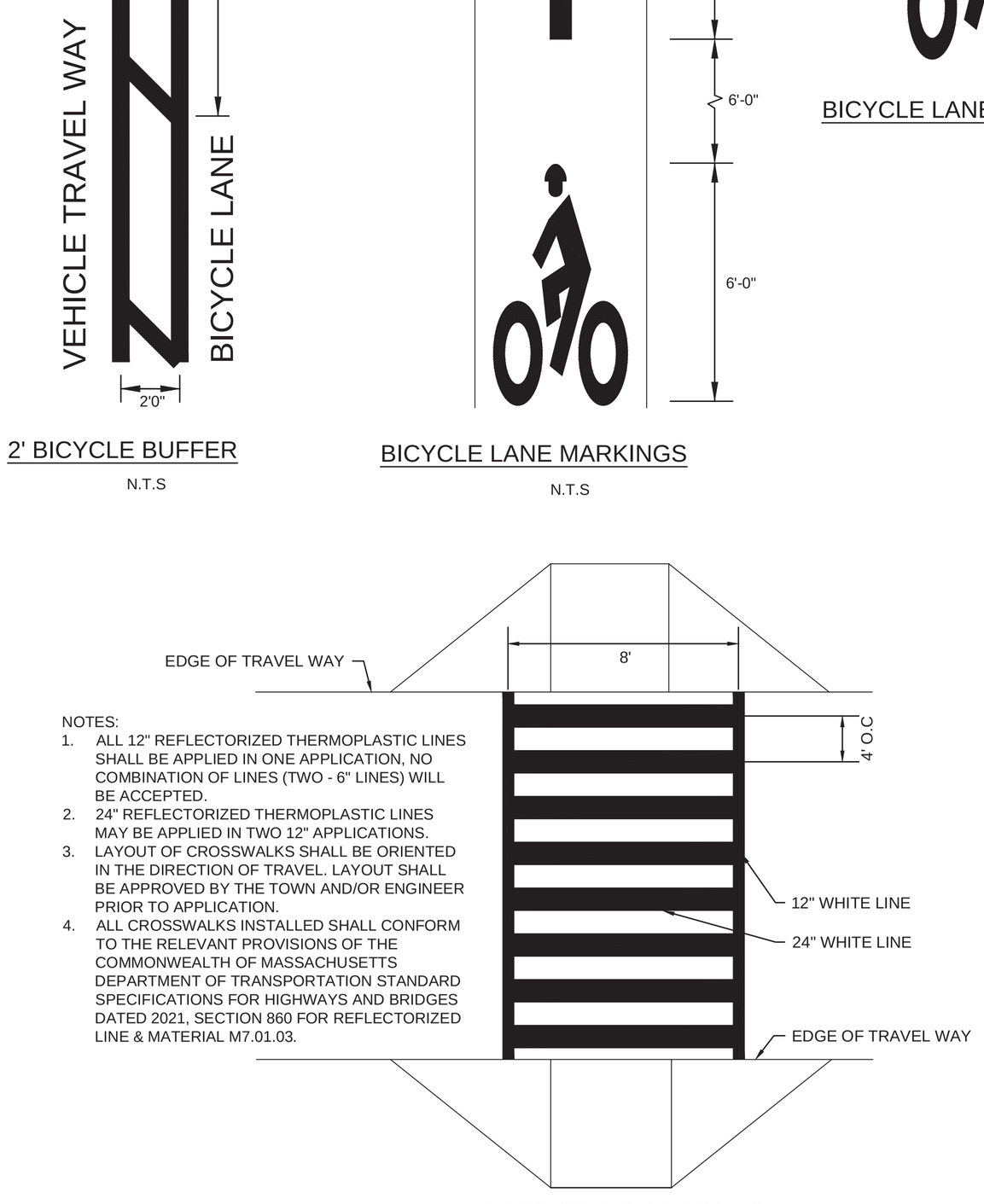
N.T.S.



NOTES:
1. CONCRETE AND SAWCUT SHALL BE INCLUDED IN PRICE BID FOR GRANITE CURB.
2. SAWCUT 12" FROM CURB LINE AND REMOVE EXISTING PAVEMENT AND GRAVEL. REPLACE WITH CEMENT CONCRETE.
3. ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

GRANITE CURB IN EXISTING PAVEMENT WITH MILL/OVERLAY

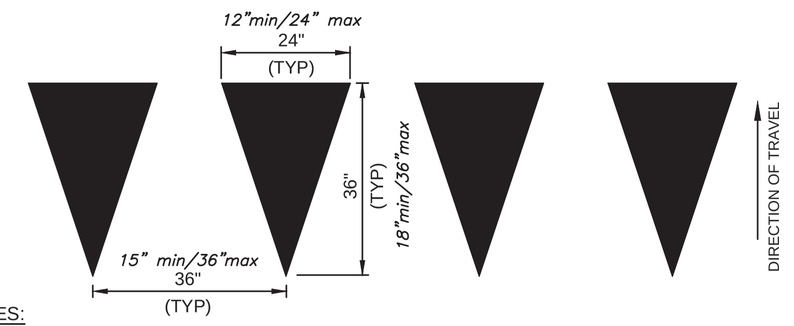
N.T.S.



NOTES:
1. ALL 12" REFLECTORIZED THERMOPLASTIC LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED.
2. 24" REFLECTORIZED THERMOPLASTIC LINES MAY BE APPLIED IN TWO 12" APPLICATIONS.
3. LAYOUT OF CROSSWALKS SHALL BE ORIENTED IN THE DIRECTION OF TRAVEL. LAYOUT SHALL BE APPROVED BY THE TOWN AND/OR ENGINEER PRIOR TO APPLICATION.
4. ALL CROSSWALKS INSTALLED SHALL CONFORM TO THE RELEVANT PROVISIONS OF THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 2021, SECTION 860 FOR REFLECTORIZED LINE & MATERIAL M7.01.03.

LADDER STYLE CROSSING

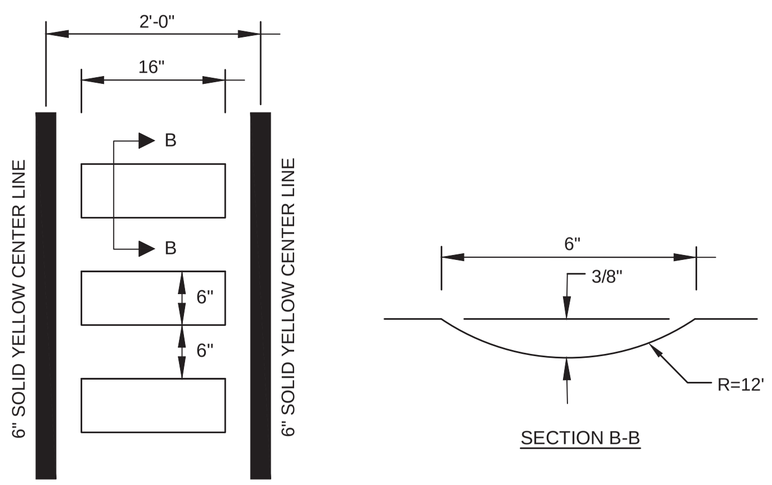
N.T.S.



NOTES:
1. YIELD LINES SHALL CONSIST OF A ROW OF SOLID WHITE TRIANGLES.
2. IF APPLICABLE, YIELD LINES SHALL BE PLACED 4-FEET IN ADVANCE OF THE NEAREST CROSSWALK LINE.
3. IN THE ABSENCE OF A MARKED CROSSWALK, YIELD LINES SHALL BE PLACED AS SHOWN ON THE PLANS.

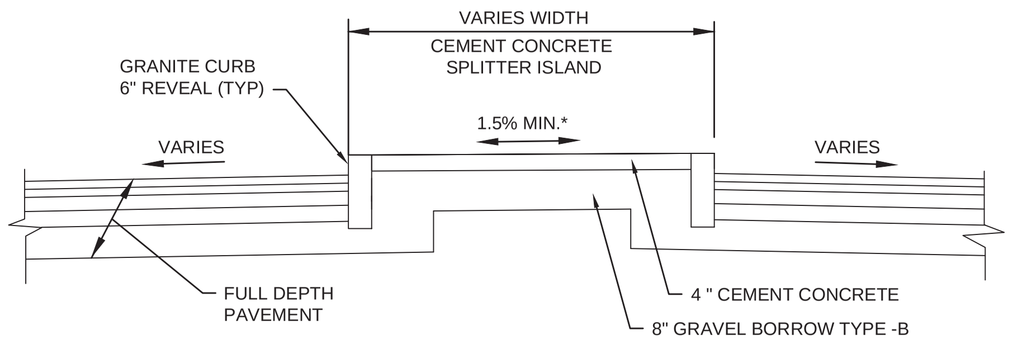
YIELD LINE TRIANGLES

N.T.S.



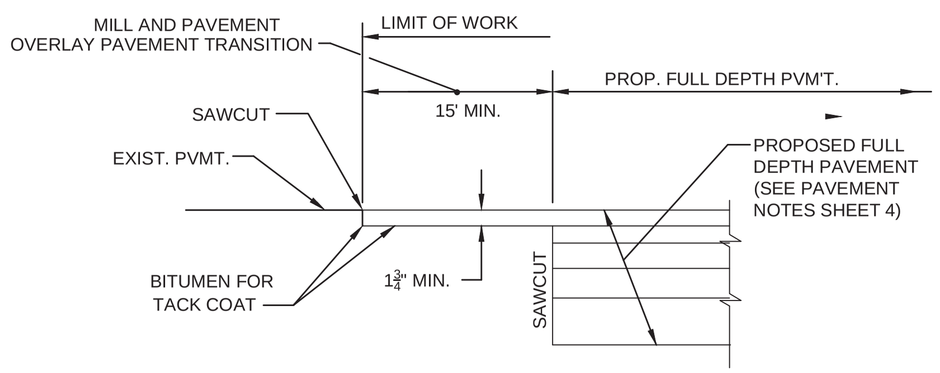
RUMBLE STRIP DETAILS

NOT TO SCALE



CEMENT CONCRETE SPLITER ISLAND DETAIL

N.T.S.



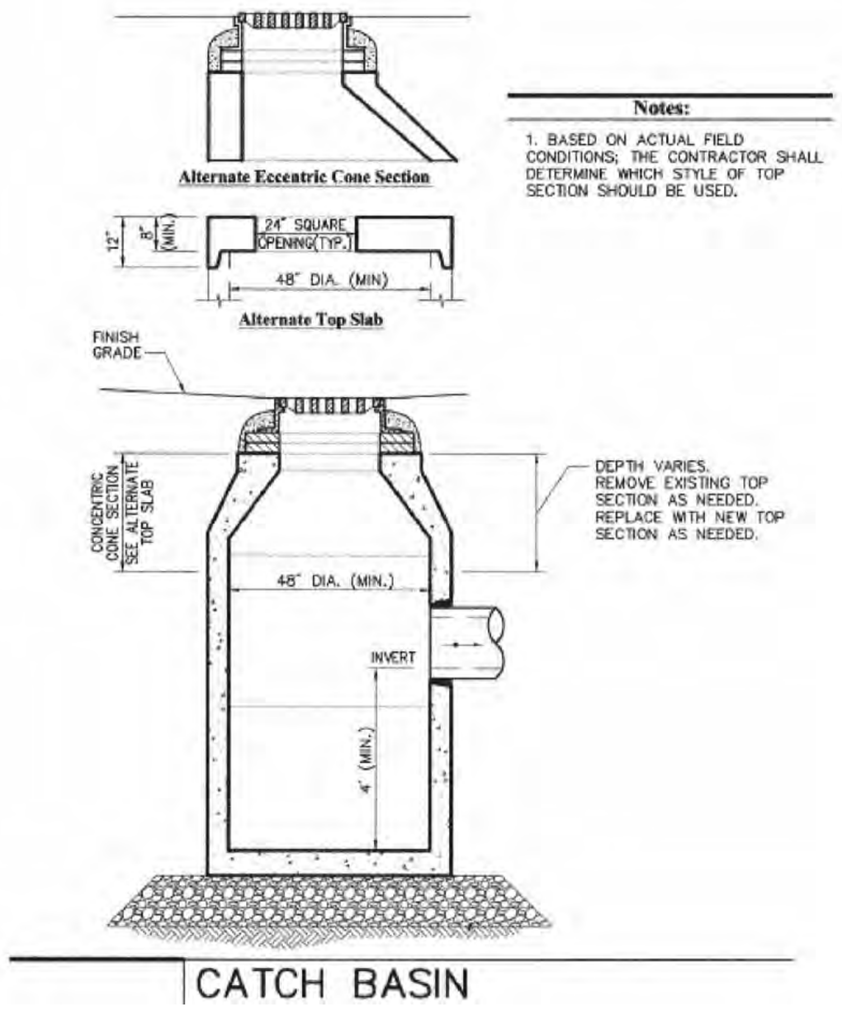
JOINT DETAILS AT PAVING LIMITS

N.T.S.

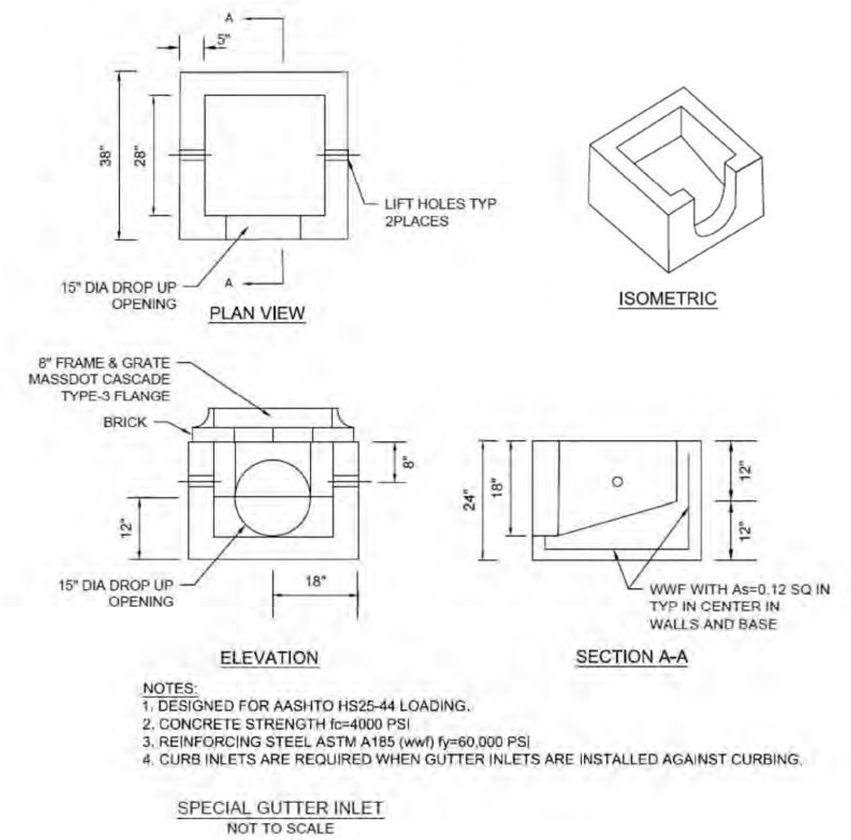
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	164	280
PROJECT FILE NO.	608744		

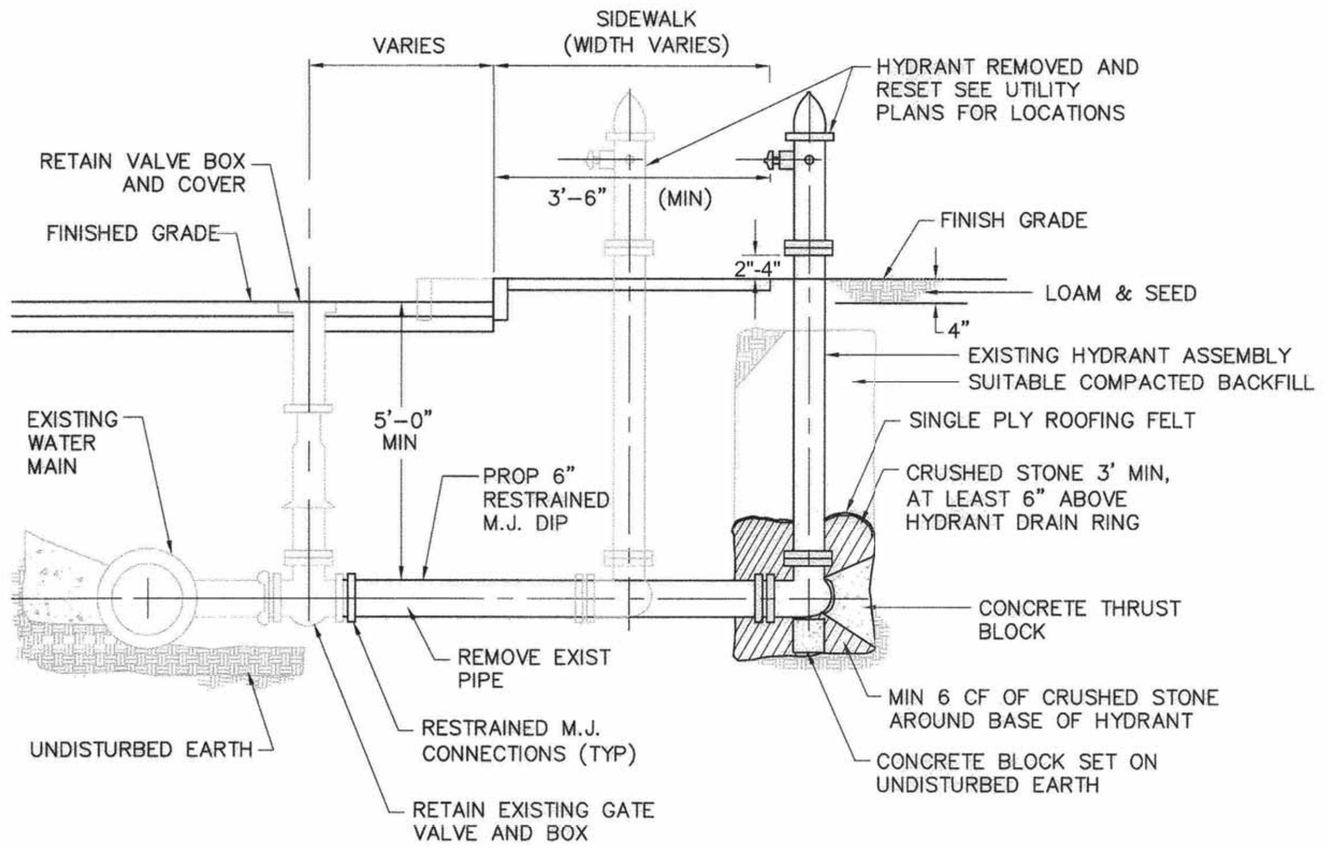
CONSTRUCTION DETAILS - 04



OFFSET CATCH BASIN
N.T.S.



SPECIAL GUTTER INLET
NOT TO SCALE



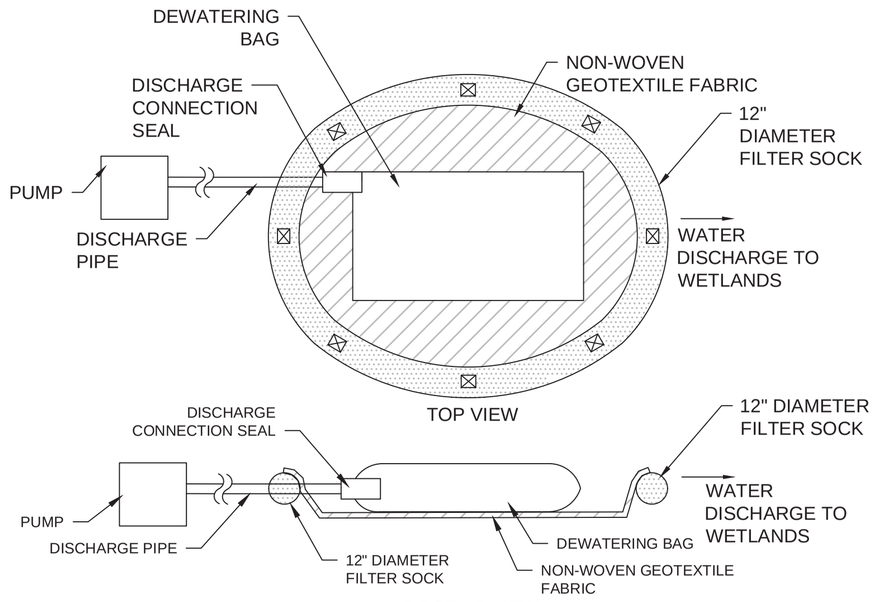
DETAIL FOR HYDRANT REMOVED AND RESET
N.T.S.

608744_HD(CONST_DETAILS).DWG Plotted on 1-May-2025 12:06 PM
Proposal No. 608744-136412
AM8860 - 217

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	165	280
PROJECT FILE NO.	608744		

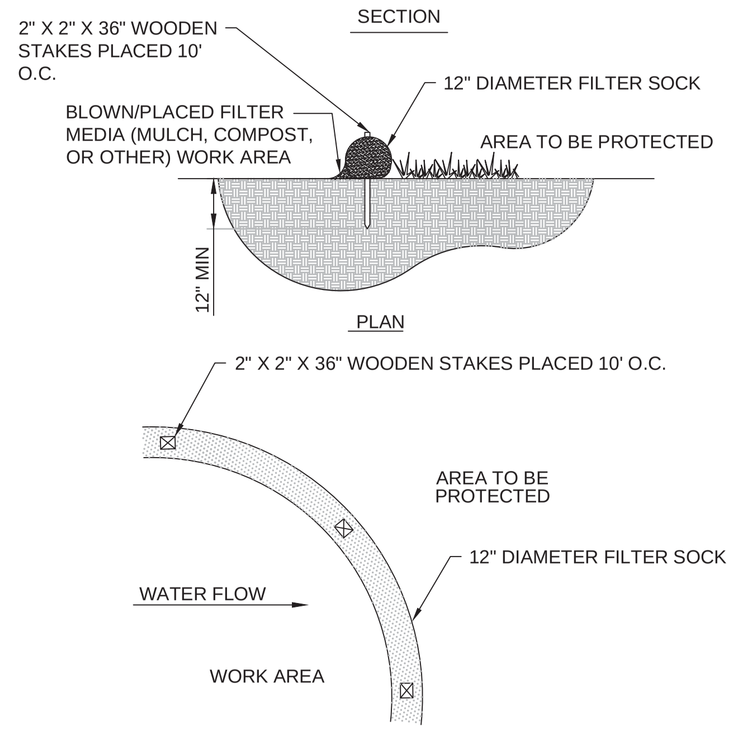
CONSTRUCTION DETAILS - 05



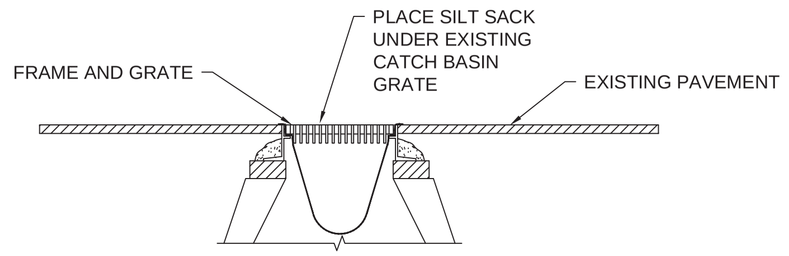
NOTES:

1. DEWATERING BAG SIZE AND QUANTITY SHALL BE AS NEEDED TO ADEQUATELY FILTER ALL PUMP EFFLUENT FROM DEWATERING ACTIVITIES. CONTRACTOR SHALL PROVIDE A REDUNDANT BAG ON SITE AT ALL TIMES.
2. EACH BAG SHALL HANDLE A 2", 3", OR 4" DISCHARGE HOSE.
3. DISCHARGE HOSES CAN BE PLACED ALONG ANY EDGE BY MAKING A SMALL INCISION INTO THE FABRIC, INSERTING THE HOSE, AND THEN CLAMPING THE FABRIC TO THE HOSE VIA WIRE, TIES, CLAMP, ROPE OR SIMILAR TO CREATE A GOOD SEAL.
4. CONTRACTOR SHALL AVOID DISCHARGING MULTIPLE PIPES INTO ONE BAG.
5. DISCHARGE FROM DEWATERING BAGS SHALL BE TO THE WETLANDS SOUTH OF THE PUMP STATION SITE.

DEWATERING BAGS
SCALE: N.T.S.



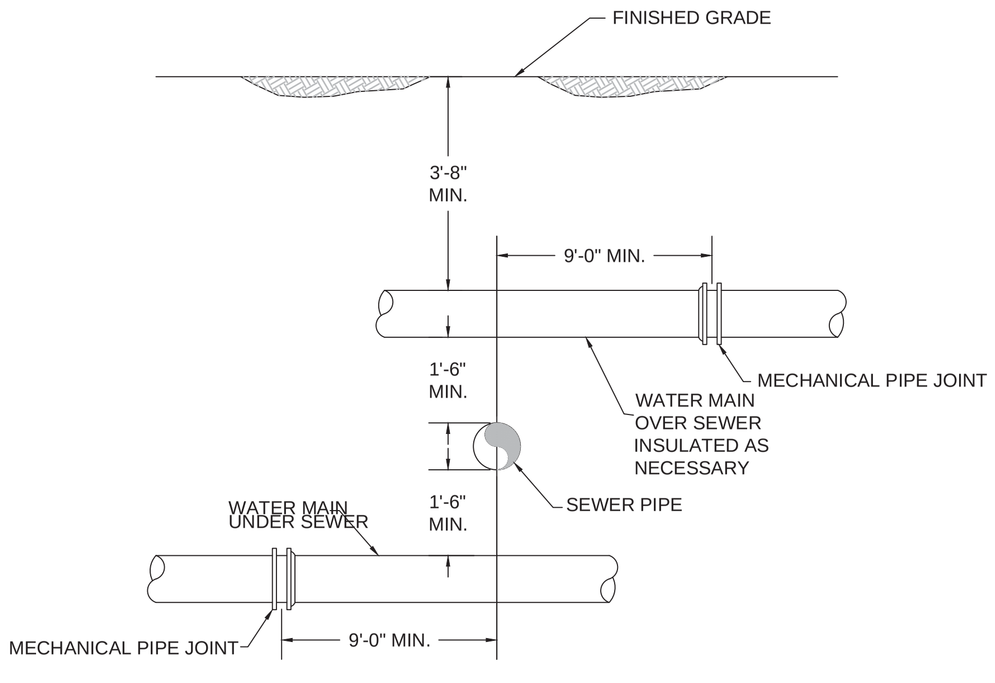
12" DIAMETER FILTER SOCK (AS REQUIRED)
SCALE: N.T.S.



NOTES:

1. SILT SACKS SHALL BE INSPECTED WEEKLY AND ACCUMULATED SILT REMOVED TO ALLOW CATCH BASIN TO FUNCTION PROPERLY.
2. HIGH CAPACITY SILT SACK AS MANUFACTURED BY ACF ENVIRONMENTAL OR APPROVED EQUAL.

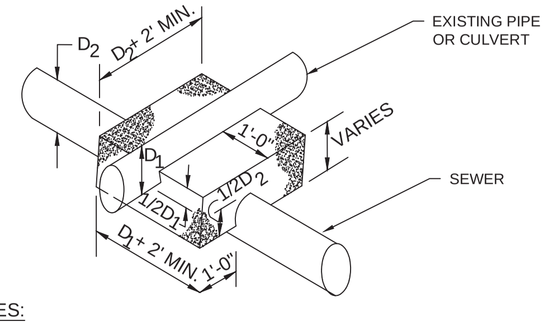
SEDIMENTATION CONTROL AT CATCH BASINS SILT SACKS
SCALE: N.T.S.



NOTES:

1. SEWERS SHALL BE KEPT REMOTE FROM WATER SUPPLY PIPING AND STRUCTURES. WHEREVER FEASIBLE, SEWERS SHOULD BE LAID AT A MINIMUM HORIZONTAL DISTANCE OF 10 FEET FROM WATER MAINS. IF LOCAL CONDITIONS PREVENT THIS, THE WATER MAIN SHOULD BE LAID IN A SEPARATE TRENCH, AND THE ELEVATIONS OF THE CROWN OF THE SEWER PLACED AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN.
2. WHENEVER SEWERS MUST CROSS UNDER WATER MAINS, THE CROWN OF THE SEWER SHOULD BE PLACED A MINIMUM OF 18 INCHES BELOW THE INVERT OF THE WATER MAIN. IN ADDITION, THE WATER MAIN MUST BE CONSTRUCTED WITH ONE FULL LENGTH OF PIPE CENTERED ABOVE THE CROSSING. THE WATER PIPE SHALL HAVE MECHANICAL JOINTS FOR A MINIMUM DISTANCE OF 10 FEET ON EACH SIDE OF THE CROSSING.
3. WHEN IT IS IMPOSSIBLE TO OBTAIN HORIZONTAL OR VERTICAL SEPARATION AS STIPULATED ABOVE, BOTH THE WATER AND THE SEWER PIPING SHALL BE CONSTRUCTED SUCH THAT THE PIPE JOINTS ARE PLACED AS FAR AWAY FROM THE CROSSING AS POSSIBLE AND THE PIPE CROSSING SHALL BE ENCASED IN CONTROL DENSITY FILL FOR A DISTANCE OF 10 FEET ON ALL SIDES OF THE CROSSING.

SEWER CROSSING
SCALE: N.T.S.

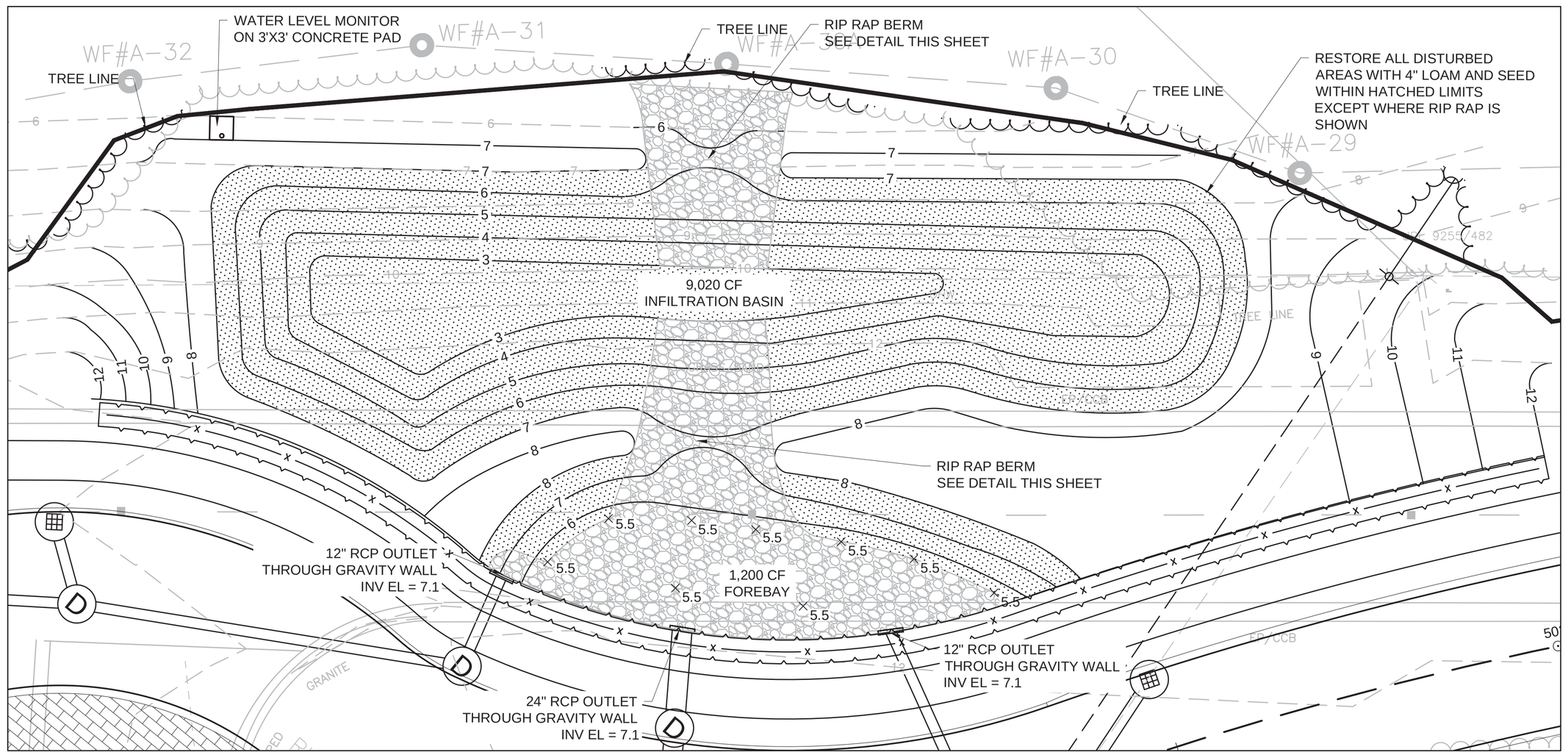


NOTES:

1. CONCRETE ENCASEMENT OF SEWER WHEN CROSSING A UTILITY WILL BE REQUIRED WHENEVER ADEQUEATE COMPACTION CANNOT BE ACHIEVED BETWEEN THE UTILITY AND THE SEWER. CONCRETE TO BE PLACED BETWEEN SEWER AND UTILITY, AT THE DIRECTION OF THE ENGINEER.
2. REFER TO THE DETAIL ENTITLES "SEWER CROSSING" FOR WATER PIPE CROSSING SEWER.

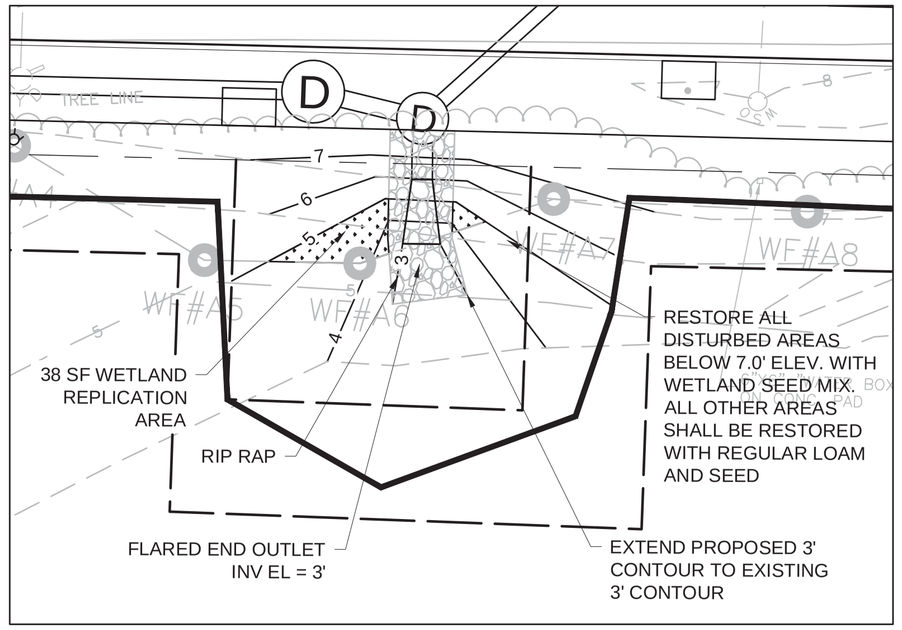
CONCRETE ENCASEMENT
SCALE: N.T.S.

608744_HD(PUMP_STATION).DWG Plotted on 5-May-2025 4:39 PM
Proposal No. 608744-134412
A008660 - 218



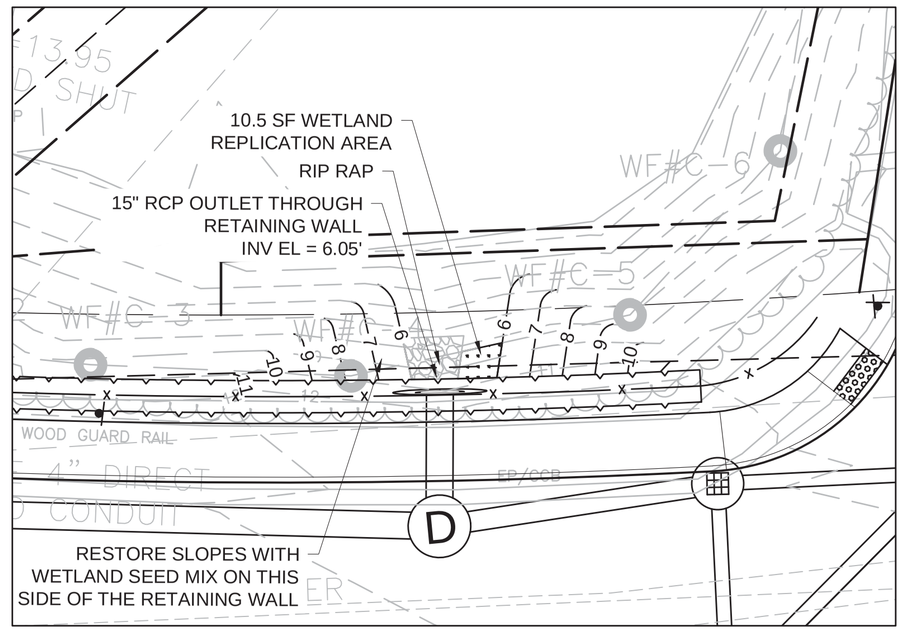
INFILTRATION BASIN GRADING PLAN

SCALE: 1"=10'



416-OF GRADING PLAN

SCALE: 1"=10'



212-OF GRADING PLAN

SCALE: 1"=10'

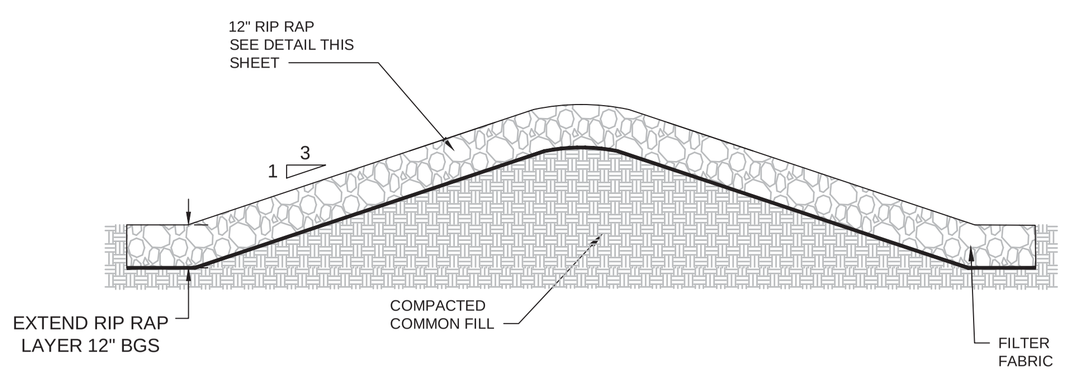


NOTE:

1. SEED MIXTURE COMPOSITION SHALL BE CAPE COD LANDSCAPE UTILITY SEED MIX, FREE OF FERTILIZERS.
2. LOAM SHALL BE NATIVE TO CAPE COD AND OF LOW NITROGEN CONTENT.
3. INSTALL CURLEX CL EROSION CONTROL BLANKET AS MANUFACTURED BY AMERICAN EXCELSIOR COMPANY (OR APPROVED EQUAL) ON ALL LOAM AND SEEDED SLOPES 3:1 OR STEEPER.

LOAM AND SEED (DISTURBED AREAS)

SCALE: N.T.S.

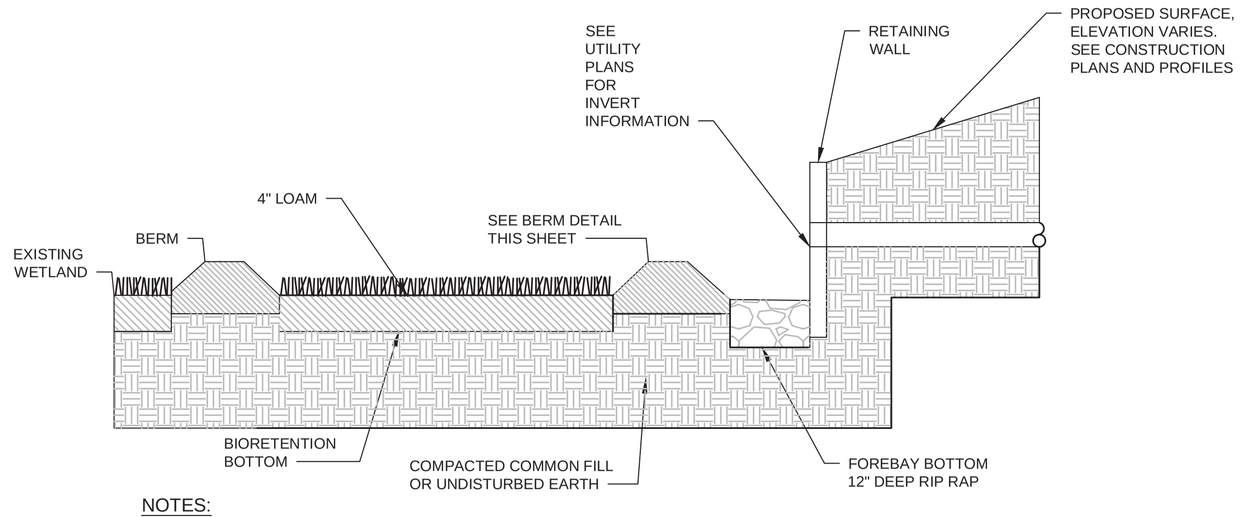


NOTES:

1. SEE PLAN FOR GRADING.

BERM DETAIL

SCALE: N.T.S.

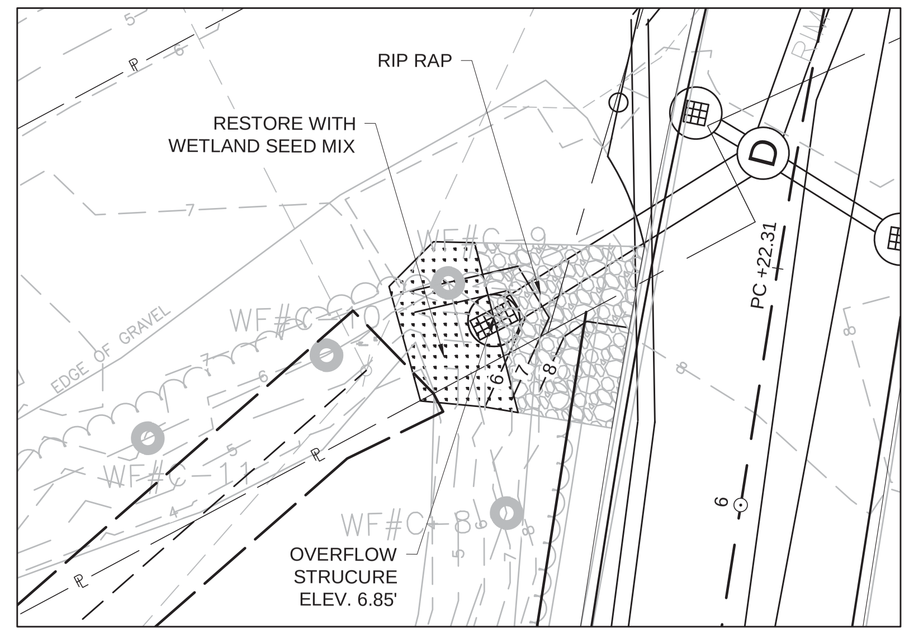


NOTES:

1. ALL AGGREGATE WITHIN THE STONE STORAGE BED SHALL BE CLEAN-WASHED, DEFINED AS HAVING LESS THAN 0.5% WASH LOSS, BY MASS, WHEN TESTED PER THE AASHTO T-11 WASH LOST TEST.
2. BOTTOM OF STORAGE SHOULD MAINTAIN A TWO-FOOT SEPARATION FROM SEASONAL HIGH GROUNDWATER.
3. SEE PLA N VIEW THIS SHEET FOR ELEVATION INFORMATION.

INFILTRATION BASIN

SCALE: N.T.S.



301-OVERFLOW GRADING PLAN

SCALE: 1"=10'

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	166	280
PROJECT FILE NO.	608744		

CONSTRUCTION DETAILS - 06

608744_HD(PUMP_STATION).DWG Plotted on 5-May-2025 4:48 PM

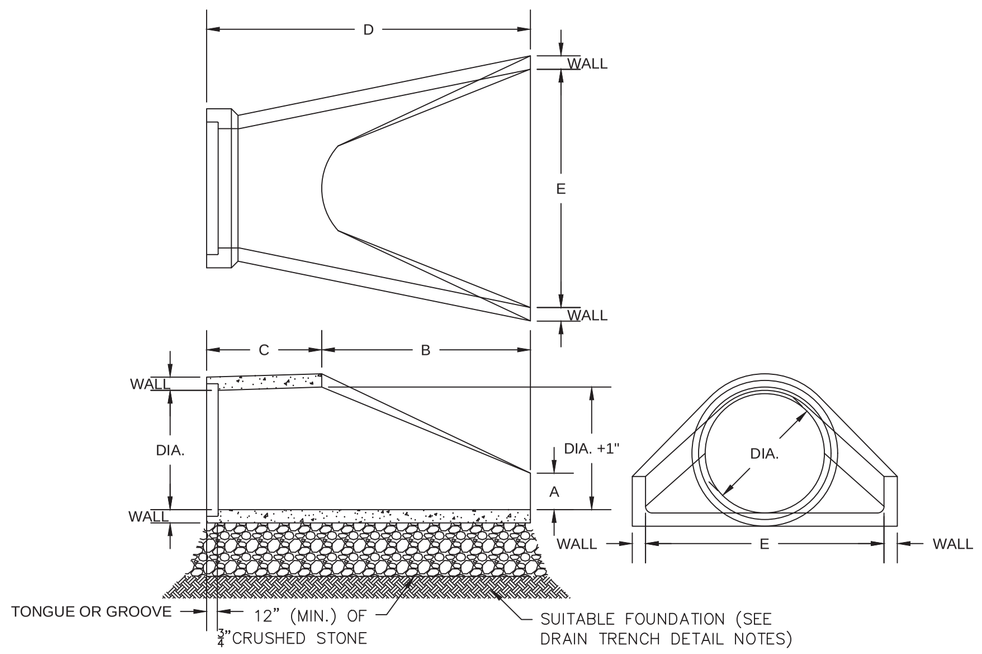
Proposal No. 608744-136412

AM8860 - 219

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	167	280
PROJECT FILE NO.		608744	

CONSTRUCTION DETAILS - 07



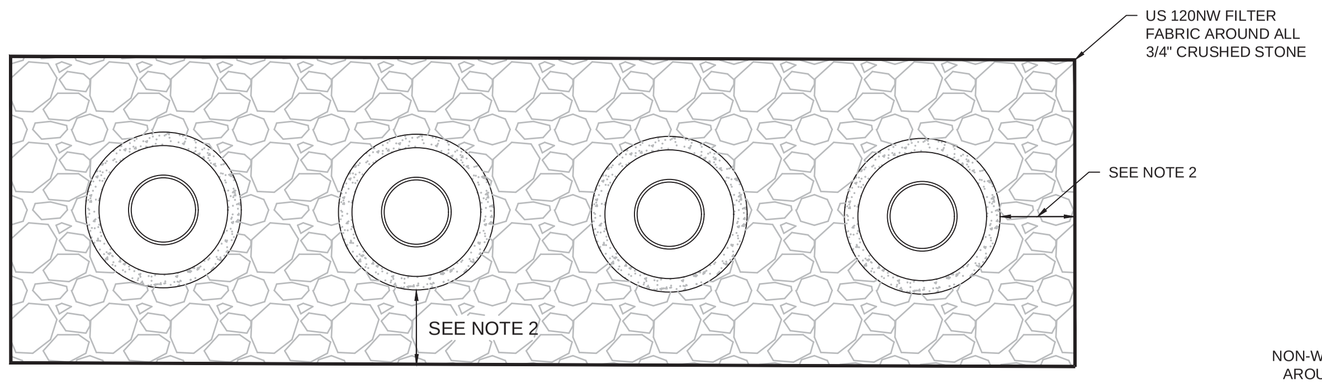
DIA.	A	B	C	D	E
12"	4"	24"	48-7/8"	73-3/8"	24"
15"	6"	27"	46"	73"	30"
18"	9"	27"	46"	73"	36"
24"	9-1/2"	43-1/2"	30"	73-1/2"	48"
30"	12"	54"	19-3/4"	73-3/4"	60"
36"	15"	63"	34-3/4"	97-3/4"	72"

NOTES:

1. REINFORCED CONCRETE PIPE CONFORMS TO ASTM C-76, ASTM-C-443, AASHTO M-170, AND AASHTO M-198.

RCP FLARED END OUTLET

SCALE: N.T.S.

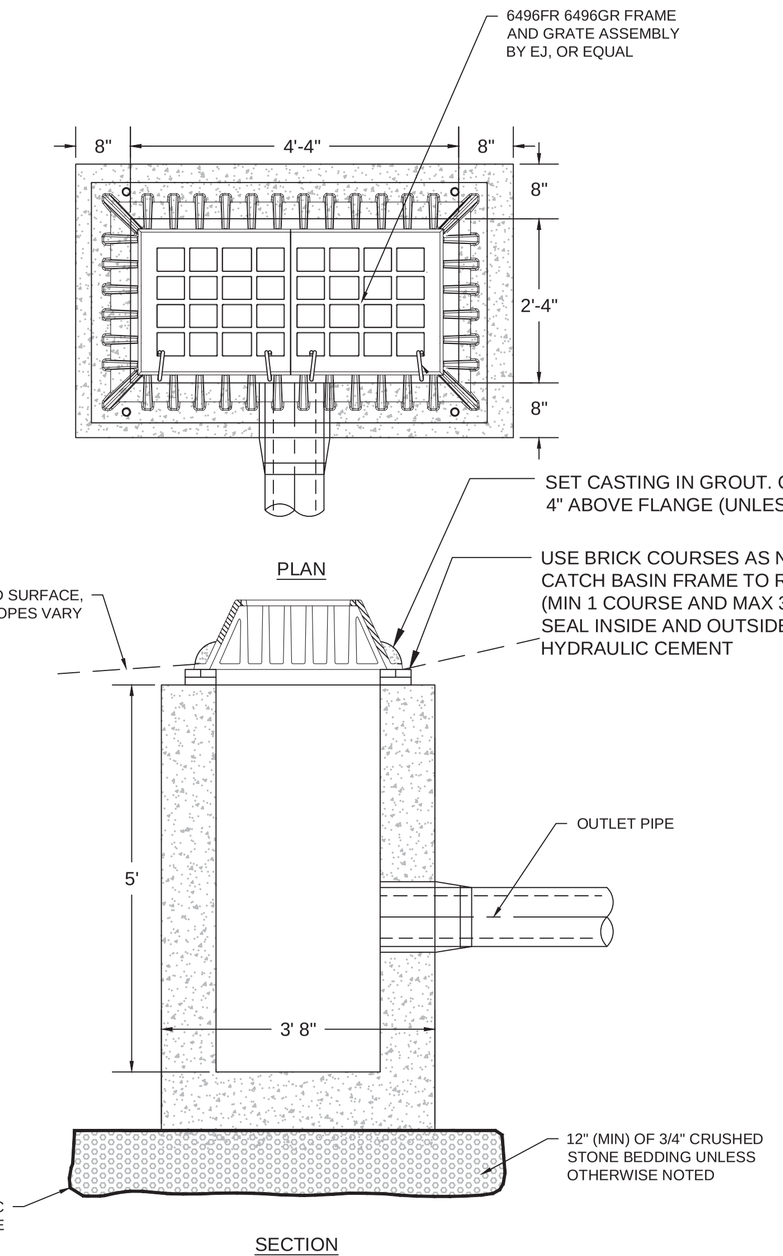


NOTES:

1. LEACHING BASIN SHALL BE ACCORDING TO MASS DOT STANDARD DETAIL 205.2.0 WITH THE FOLLOWING CHANGES: 6' INNER DIAMETER STRUCTURE, AND USING A FRAME AND COVER INSTEAD OF FRAME AND GRATE.
2. 3/4" CRUSHED STONE SHALL EXTEND 1' BEYOND THE EDGE OF THE STRUCTURES IN ALL DIRECTIONS

LEACHING PITS

SCALE: N.T.S.



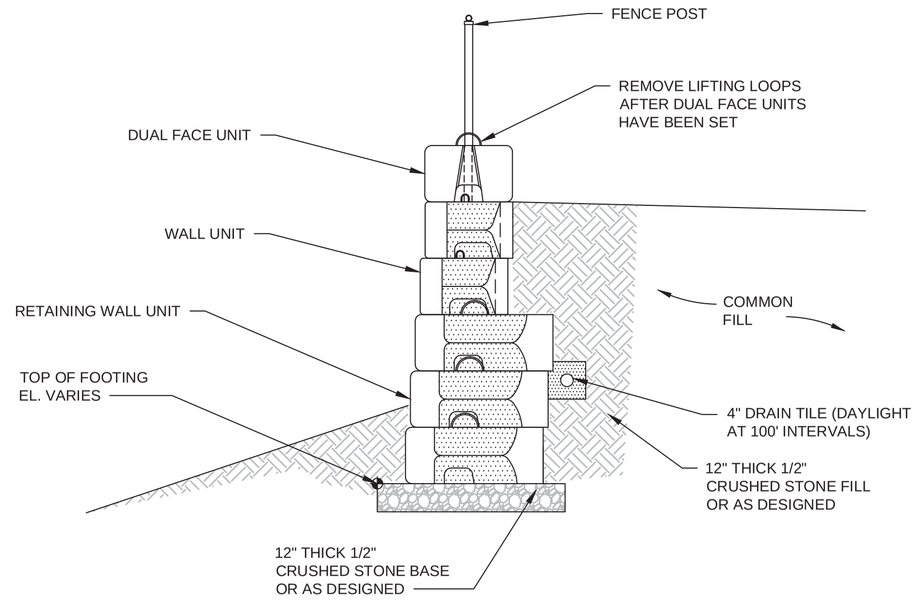
SECTION

NOTES:

1. H-20 LOADING PER AASHTO HS-20-44; ASTM C478 SPEC. FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".

COURT STREET POND OUTLET STRUCTURE

SCALE: N.T.S.

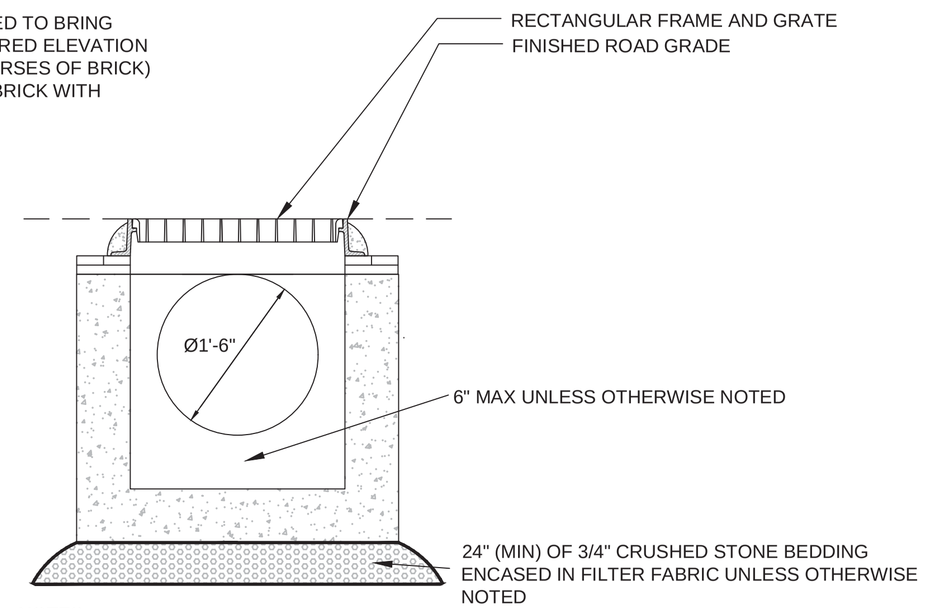


NOTES:

1. THE CONTRACTOR SHALL SUBMIT BLOCK WALL SHOP DRAWINGS DESIGNED AND STAMPED BY A LICENSED MA GEOTECHNICAL ENGINEER.

BLOCK WALL CROSS SECTION

SCALE: N.T.S.



NOTES:

1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.

2. REINFORCED STEEL TO CONFORM TO LATEST ASTM A185 SPEC.

3. H-20 LOADING PER AASHTO HS-20-44; ASTM C478 SPEC. FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".

4. FRAME SHALL BE 4 FLANGE.

5. GRATE SHALL BE SQUARE HOLE GRATE UNLESS OTHERWISE REQUIRED.

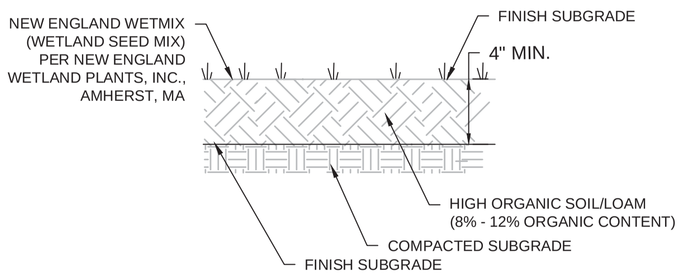
GUTTER INLET STRUCTURE

SCALE: N.T.S.

608744_HD(PUMP_STATION).DWG Plotted on 5-May-2025 4:41 PM
Proposal No. 608744-134412
AM8860 - 220

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	168	280
PROJECT FILE NO.	608744		

CONSTRUCTION DETAILS - 08



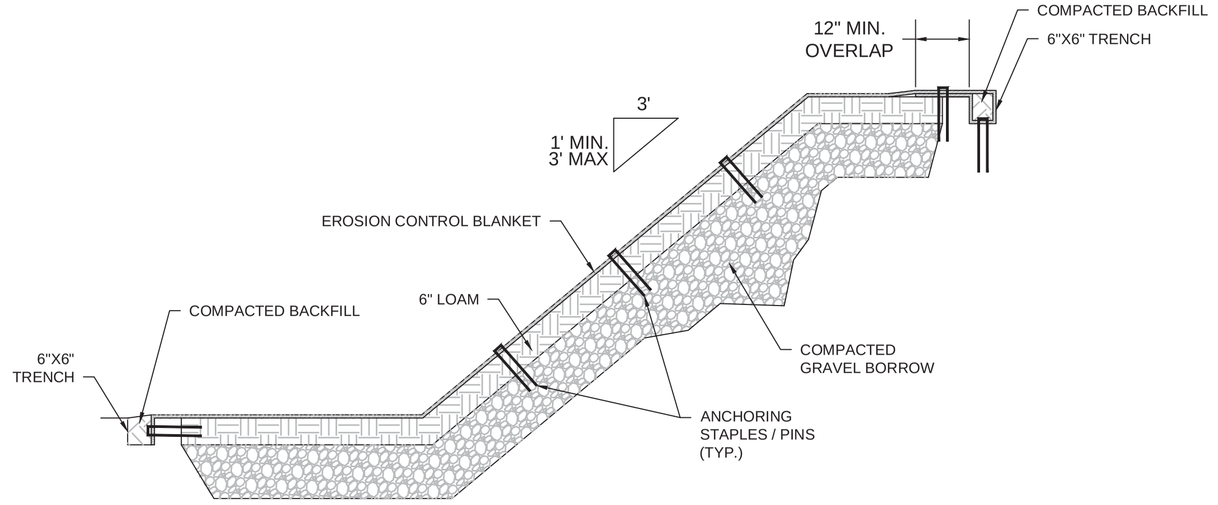
WETLAND PLANTING PLAN NOTES:

1. THE REPLICATION AREA SHALL BE EXCAVATED TO THE ELEVATION OF THE EXISTING WETLAND.
2. FOR ALL SLOPES GREATER THAN 3H:1V, ADD THE EROSION CONTROL BLANKET AS SHOWN IN THE DETAIL ON THIS SHEET.

WETLAND PLANTS MONITORING PLAN NOTES:

1. MONITORING AND REPORTING ASSOCIATED WITH THE COMPLETED WETLAND REPLICATION AREA SHOULD FOLLOW AND BE IN COMPLIANCE WITH THE ORDER OF CONDITIONS ISSUED BY THE PROVINCETOWN CONSERVATION COMMISSION AND ANY OTHER RELEVANT PERMIT THAT APPLIES.
2. ANNUAL REPORTING AND ANY DELIVERABLES WILL BE SUBMITTED TO THE APPLICABLE PERMITTING AUTHORITIES.
3. POST PLANTING, THE AREA WILL BE MONITORED AS REQUIRED IN THE MASSACHUSETTS INLAND WETLAND REPLICATION GUIDELINES AND THE ORDER OF CONDITIONS FOR A PERIOD OF TWO YEARS, TO CONDUCT VISUAL ASSESSMENT TO DETERMINE IF FURTHER ACTION IS NECESSARY TO REMOVE AND REPLACE DEAD PLANTS, REMOVE ACCUMULATED DEBRIS, AND TO REMOVE ANY UNWANTED AND COMPETING INVASIVE PLANTS.
4. SHOULD THE AREA EXPERIENCE AN UNUSUAL FLOOD EVENT, AN ADDED SITE VISIT WILL BE CONDUCTED TO ASSESS ANY DAMAGE AND TO TAKE RADIATION ACTION.
5. THE INTENT IS TO HAVE THE PLANTED WETLAND AREA ACHIEVE 75% GROWTH IN COVER AND MATURITY AT THE END OF THE TWO (2) YEAR MONITORING PERIOD.
6. EVERY OPPORTUNITY WILL BE TAKEN TO REMOVE INVASIVE PLANTS SO THEY ARE WEAKENED ALLOWING THE INDIGENOUS PLANTINGS TO TAKE OVER AND THRIVE.
7. IF THE PLANTS GET DISTRESSED DURING THE MONITORING PERIOD, AN EXAMINATION OF THE SOIL SHALL DETERMINE IF THE SOIL PH BALANCE NEEDS ADJUSTMENT OR PLANT FERTILIZATION IS NEEDED.

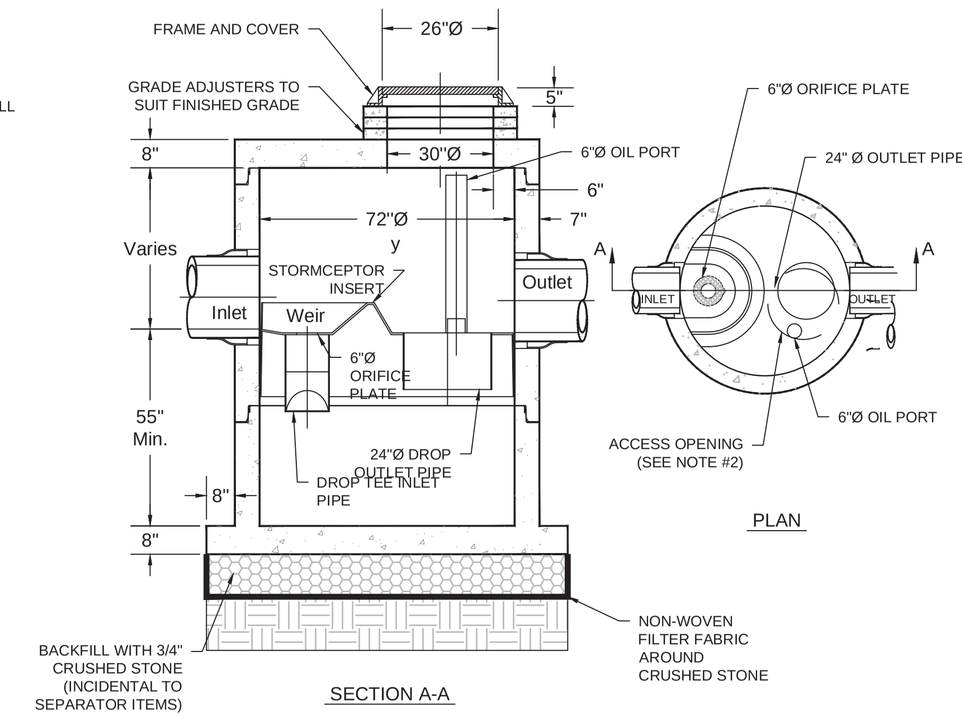
WETLAND PLANTING PLAN
SCALE: N.T.S.



NOTES:

1. EROSION CONTROL BLANKET SHALL BE ECSC-2B BY EAST COAST EROSION CONTROL, OR EQUAL.
2. REFER TO THE MANUFACTURER'S GUIDELINES FOR STAPLE ANCHORING SPACING.

EROSION CONTROL BLANKET
SCALE: N.T.S.



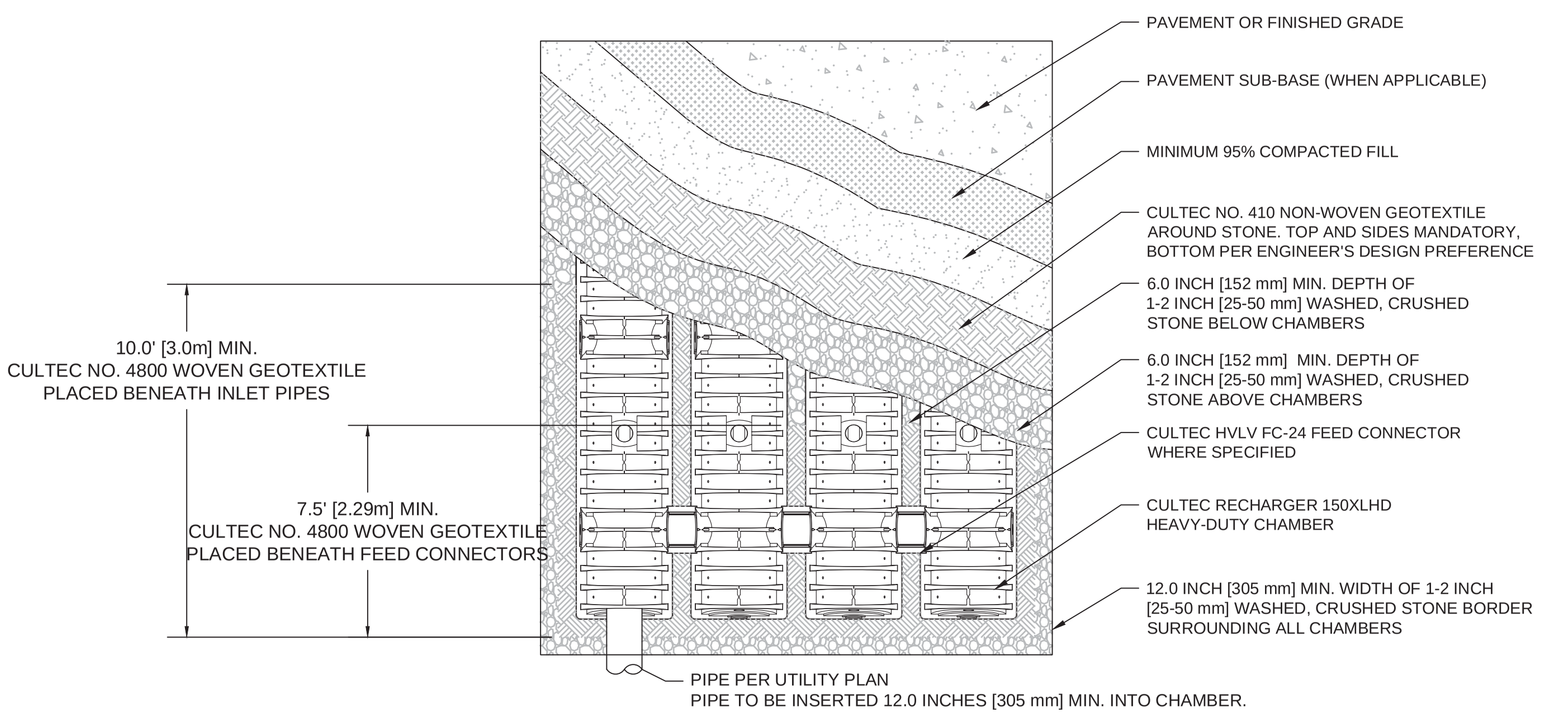
PLAN

SECTION A-A

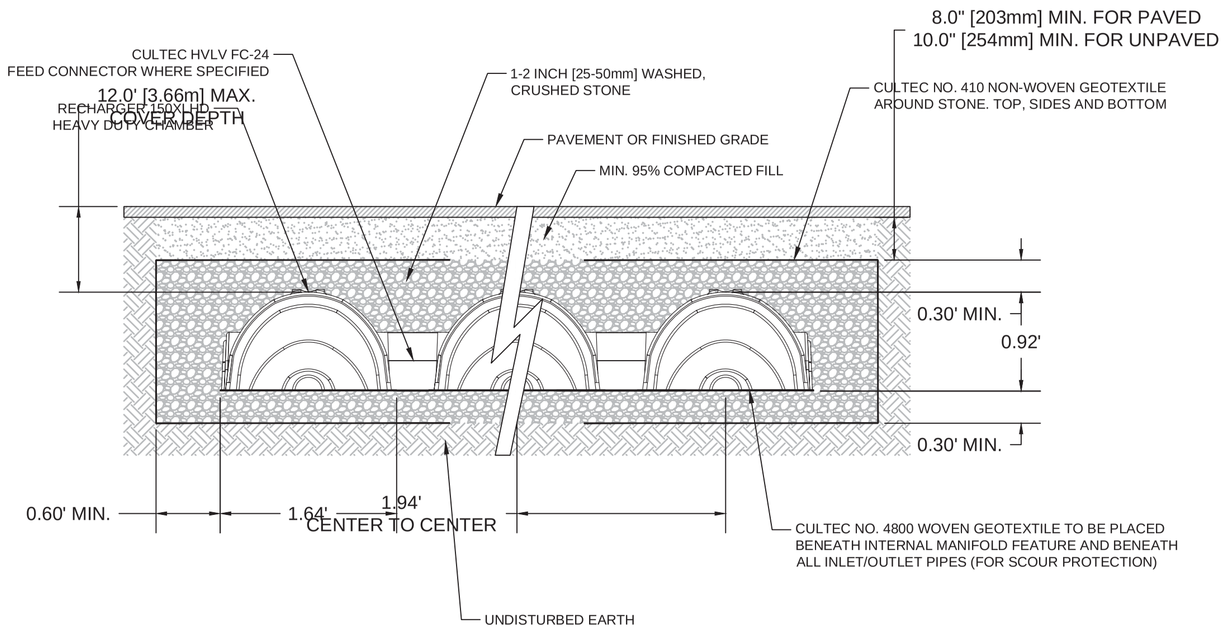
NOTES:

1. THE USE OF FLEXIBLE CONNECTIONS ARE RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHALL BE POSITIONED OVER THE OUTLET DROP PIPE AND THE OIL PORT.
3. THE HYDRODYNAPIC SEPARATOR SHALL BE AS STATED IN THE SPECIFICATIONS, OR EQUAL.

HYDRODYNAMIC SEPARATOR
SCALE: N.T.S.



PLAN



SECTION

NOTES:

1. INFILTRATION CHAMBER IS DESIGNED AROUND CULTEC 150 XLHD. CHAMBER LAYOUT SHALL BE 10 ROWS OF 7 CHAMBERS PER ROW.

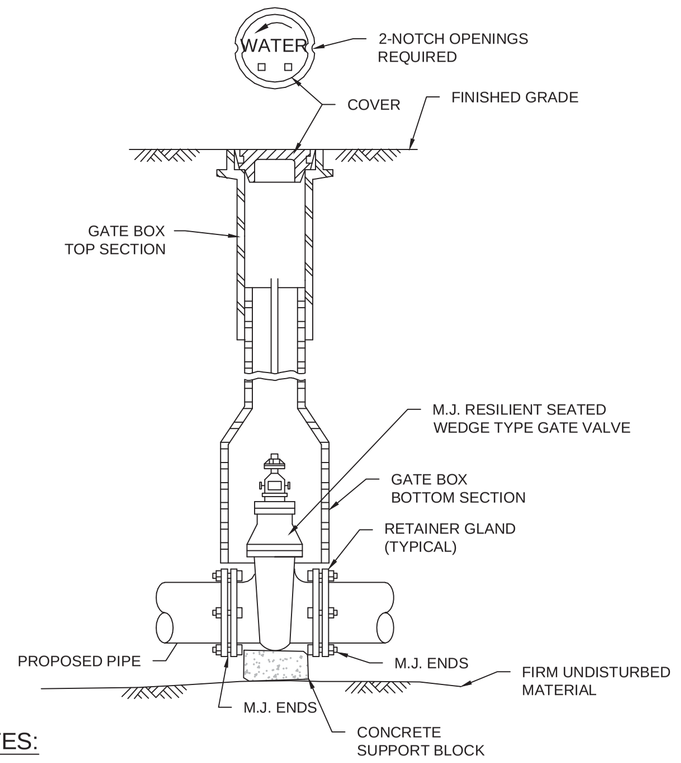
SOUTH SHANK PAINTER INFILTRATION CHAMBERS
SCALE: N.T.S.

608744_HD(PUMP_STATION).DWG Plotted on 5-May-2025 4:41 PM
Proposal No. 608744-136412
A008860 - 221

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	169	280
PROJECT FILE NO.		608744	

CONSTRUCTION DETAILS - 09

608744_HD(PUMP_STATION).DWG Plotted on 1-May-2025 12:08 PM
Proposal No. 608744-134412

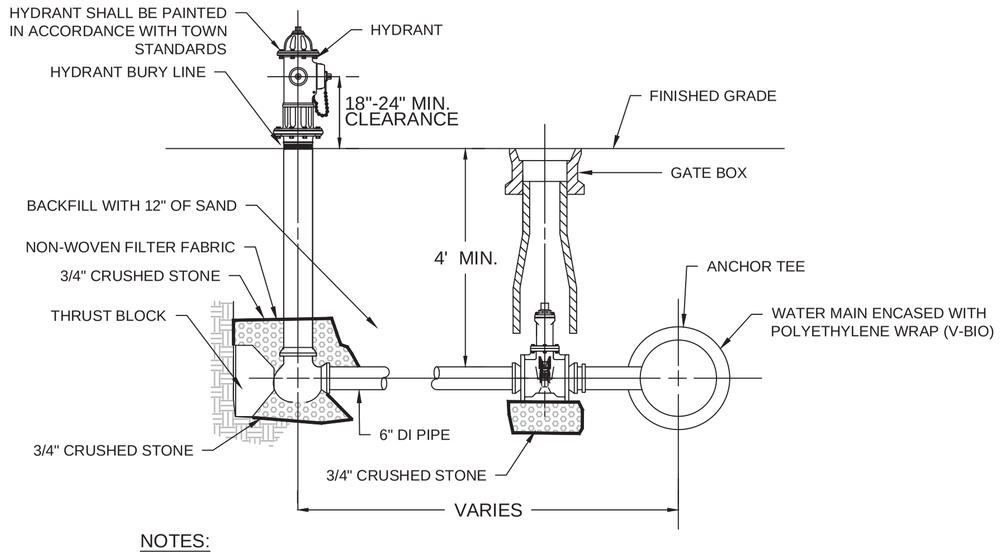


NOTES:

1. ALL EXCAVATION, BACKFILLING AND PAVING SHALL BE IN ACCORDANCE WITH THE TOWN OF PROVINCETOWN REQUIREMENTS.
2. WATER GATE COVER SHALL HAVE A MINIMUM HEIGHT OF 3.5 INCHES AND A MINIMUM WEIGHT OF 13 POUNDS, BRAND NAME BIBBY-STE-CROIX OR EQUAL.
3. VALVES SHALL HAVE A 2-INCH SQUARE OPERATING NUT, AND BE OPEN LEFT (COUNTER-CLOCKWISE TO OPEN)

GATE VALVE AND VALVE BOX DETAIL

SCALE: N.T.S.

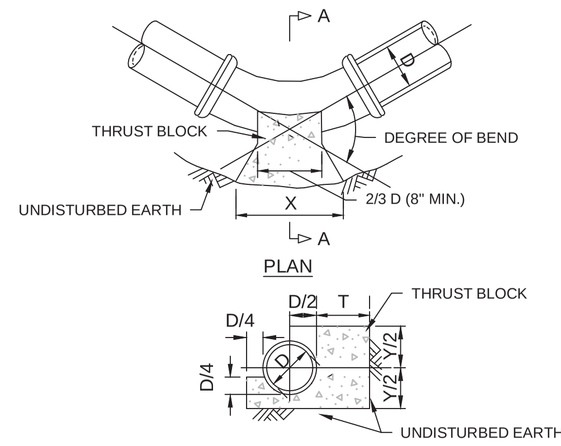


NOTES:

1. PRIOR TO INSTALLATION, CONFIRM FINAL HEIGHT OF HYDRANT WITH ENGINEER AND OWNER. FINAL HEIGHT SHALL MATCH PROPOSED GRADES FOR FUTURE ROADWAY IMPROVEMENTS PROJECT.
2. CONFIRM HYDRANT LOCATION WITH OWNER, ENGINEER AND FIRE DEPARTMENT PRIOR TO EXCAVATION.
3. ALL HYDRANT, VALVE, AND TEE JOINTS SHALL HAVE RESTRAINED MECHANICAL JOINTS.
4. DEPTH OF HYDRANT BURY SHALL SUIT INSTALLED DEPTH OF COVER OVER WATER MAIN. INSTALL RISERS AS NECESSARY AT NO ADDITIONAL COST TO THE OWNER.

HYDRANT ASSEMBLY DETAIL

SCALE: N.T.S.



NOTES:

SECTION A-A

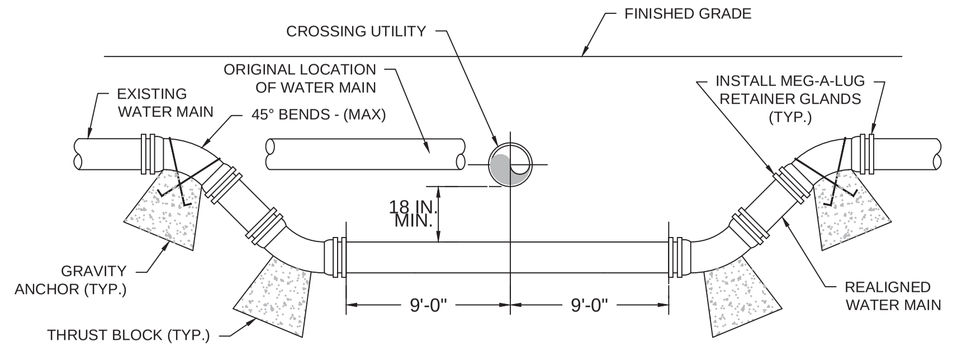
1. ALL CONCRETE SHALL BE 3000 P.S.I. @ 28 DAYS (CLASS "A" CONCRETE)
2. DIMENSIONS SHOWN ARE MINIMUM AND ARE BASED UPON SOIL PRESSURE OF 1500 P.S.F. AND TOTAL PRESSURE OF 250 P.S.I. TOTAL PRESSURE IS WORKING PRESSURE PLUS SURGE PRESSURE.
3. THRUST BLOCKS SHALL BEAR AGAINST UNDISTURBED EARTH.

TABLE OF DIMENSIONS

DIMENSION	90° BEND						45° BEND						22 1/2° BEND						11 1/4° BEND					
D (in.)	4	6	8	10	12	14	4	6	8	10	12	14	4	6	8	10	12	14	4	6	8	10	12	14
X (in.)	35	35	50	56	72	80	24	24	35	45	51	60	28	28	30	32	37	42	12	12	19	21	27	33
Y (in.)	20	20	24	32	35	40	16	16	19	21	27	33	13	13	13	16	19	22	8	8	9	12	13	16
T (in.)	11	11	14	16	19	22	11	11	14	16	19	22	11	11	13	16	19	22	11	11	13	16	19	22

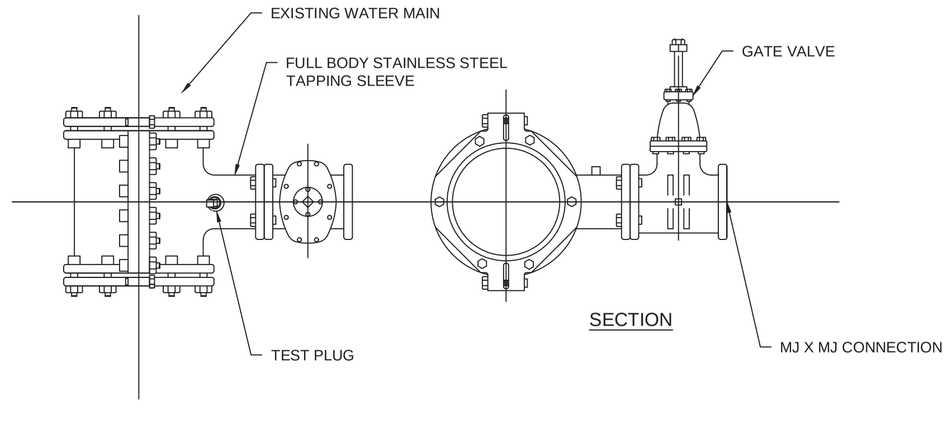
CONCRETE THRUST BLOCK DETAIL AT BEND

SCALE: N.T.S.



WATER MAIN LOWERING DETAIL

SCALE: N.T.S.



TAPPING SLEEVE AND GATE VALVE

SCALE: N.T.S.

A00860 - 222

608744_HD(PUMP_STATION).DWG Plotted on 1-May-2025 12:09 PM
Proposal No. 608744-136412
A00860 - 223

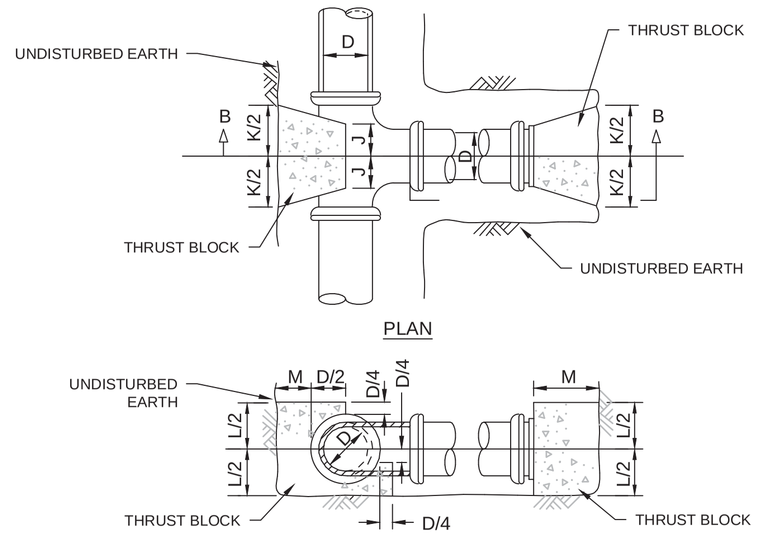
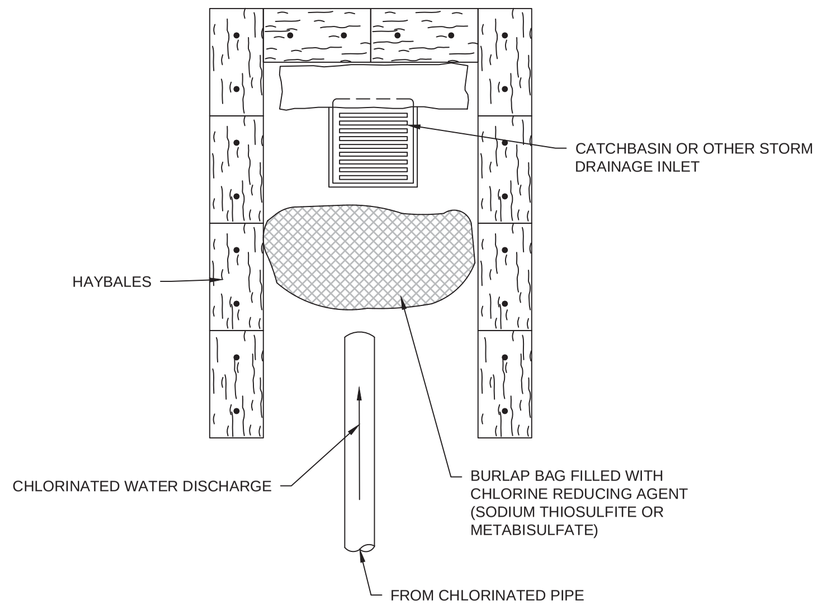


TABLE OF DIMENSIONS						
D (in)	4	6	8	10	12	14
J (in)	6	6	7	9	10	12
K (in)	16	16	20	26	32	36
L (in)	16	16	21	24	29	34
M (in)	11	11	14	16	19	22

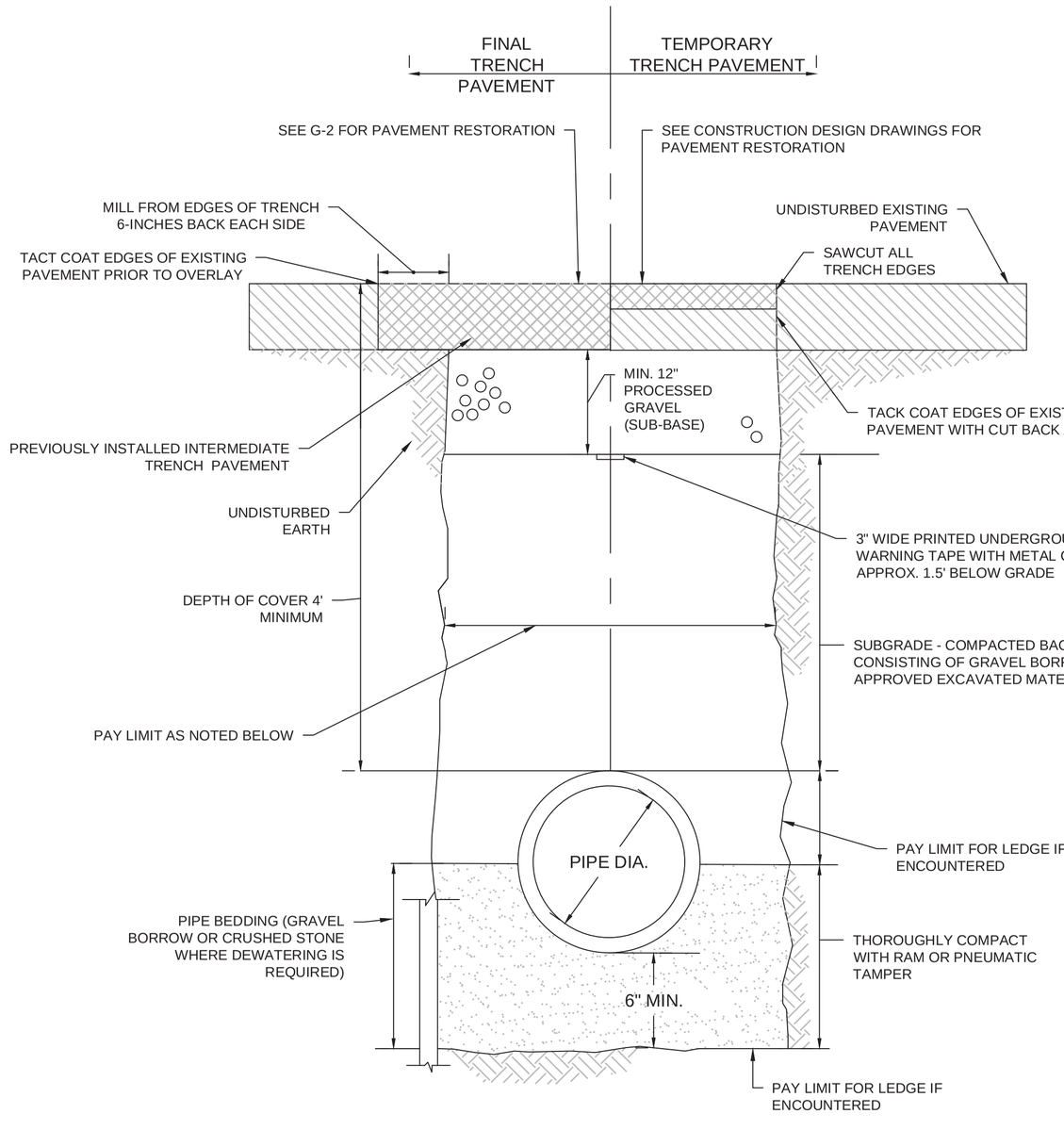
CONCRETE THRUST BLOCK DETAIL AT TEE / PLUG/CAP

SCALE: N.T.S.



DECHLORINATION DETAIL

SCALE: N.T.S.

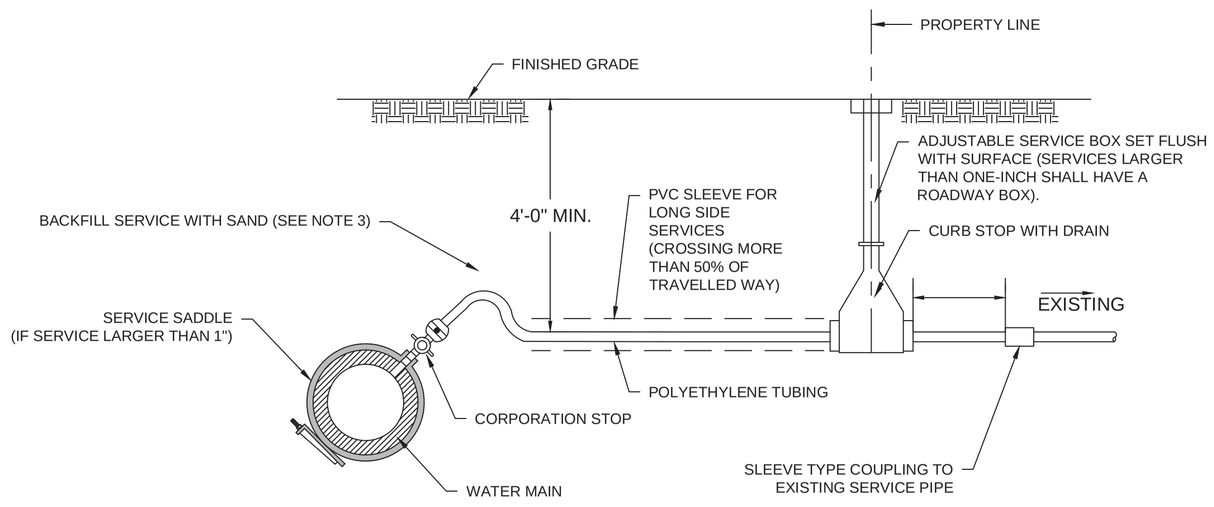


WATER MAIN TRENCH DETAIL

SCALE: N.T.S.

NOTES:

1. INSTALL RECESSED STEEL PLATES DAILY ON PAVED ROAD SURFACES.
2. INSTALL TEMPORARY TRENCH PAVEMENT WEEKLY.
3. REMOVE TEMPORARY TRENCH PAVEMENT AND INSTALL INTERMEDIATE TRENCH PAVEMENT AFTER ALL CLEANING AND LINING IS COMPLETED, TESTED, AND ACCEPTED BY THE ENGINEER.
4. FOR WATER MAIN TRENCH, THE PAY LIMIT FOR TRENCH WIDTH IS 4'.
5. PAVEMENT INSTALLED BEYOND PAYMENT LINE MUST BE PRE-APPROVED BY THE ENGINEER AND AT THE CONTRACTOR'S EXPENSE.



NOTES:

1. ALL EXISTING SERVICES SHALL BE CLOSED AT THE CORPORATION AND EXISTING SERVICE TUBING SHALL BE ABANDONED IN PLACE.
2. ALL JOINTS SHALL BE COMPRESSION TYPE.
3. PE SERVICE LINE SHALL BE BACKFILLED WITH SAND BY HAND TO 12" ABOVE TUBING AND SHALL HAVE A SAND BEDDING OF 6".
4. CORPORATION STOPS LARGER THAN ONE INCH SHALL HAVE A SADDLE.
5. WATER SERVICES SHALL BE INSULATED IN AREAS WHERE CONNECTION TO EXISTING WATER SERVICE IS LESS THAN 4 FEET.
6. ALL WATER SERVICE PLUMBING MATERIALS SHALL BE "LEAD FREE" IN ACCORDANCE WITH SECTION 1417 OF THE SAFE DRINKING WATER ACT AND SECTION 9 OF NSF STANDARD 61.
7. SERVICE BOX SHALL BE MANUFACTURED IN NORTH AMERICA.

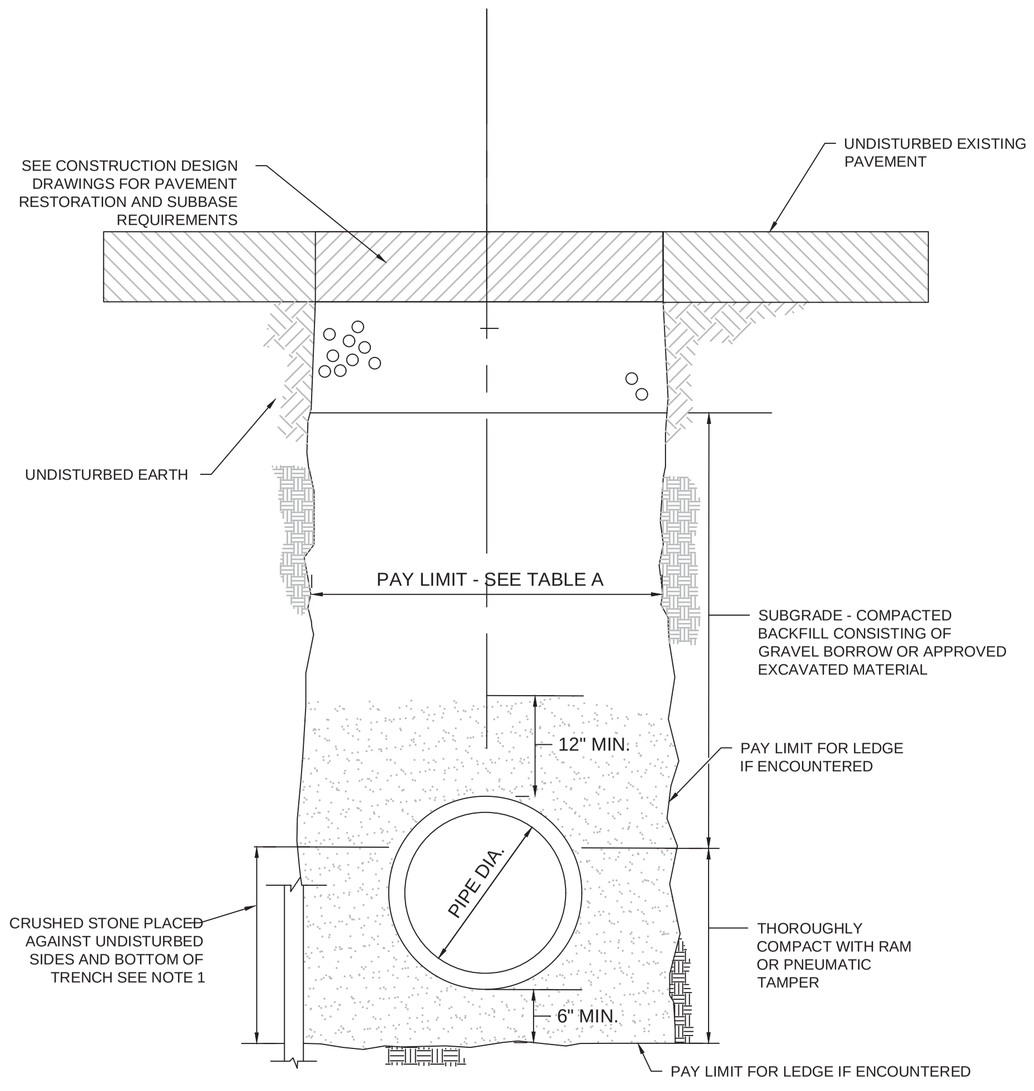
TYPICAL SERVICE TRANSFER DUCTILE IRON WATER MAINS

SCALE: N.T.S.

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	171	280
PROJECT FILE NO.	608744		

CONSTRUCTION DETAILS - 11

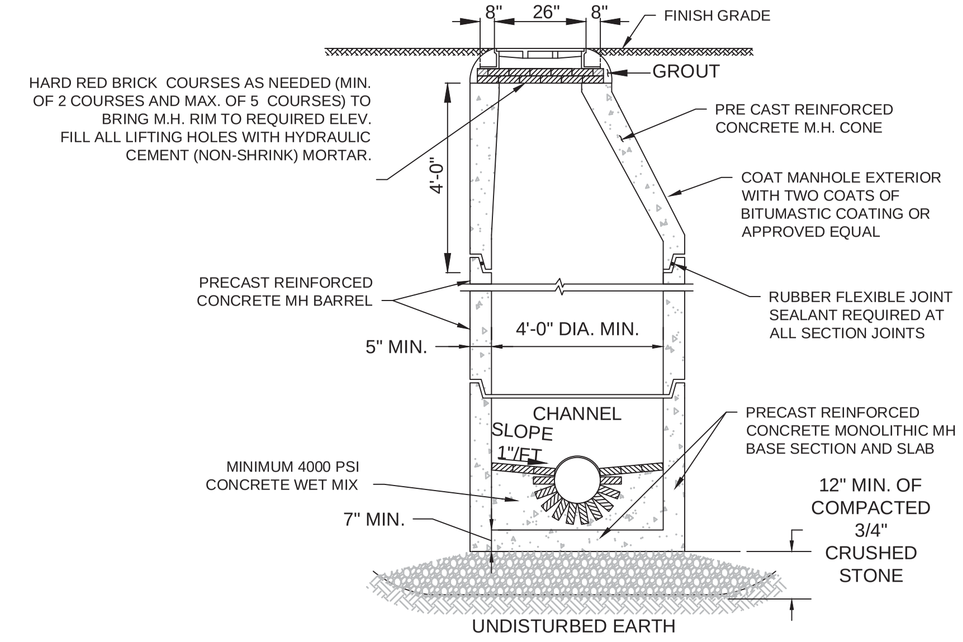


NOTES:

1. FOR PIPES OTHER THAN P.V.C., SELECTED COMMON FILL MAY BE USED FROM MID-DIAMETER OF PIPE TO 12" ABOVE TOP OF PIPE.
2. TRENCHES LOCATED ON THE ROAD SHOULDER SHALL BE TREATED THE SAME AS STREET EXCEPT FOR PAVING.
3. PROVIDE AT LEAST ONE IMPERVIOUS DAM IN BEDDING BETWEEN EACH MANHOLE OR EVERY 300 FT., WHICHEVER IS LESS.

TABLE A				
DEPTH TO INVERT	DIAMETER OF PIPE (DP)	MAXIMUM TRENCH WIDTH PAY LIMIT (SHEETED OR UNSHEETED) (W)	MINIMUM CLEARANCE (S)	TRENCH PAVEMENT WIDTH PAY LIMIT (TP)
0 - 12'	TO 18"	5'-0"	0'-6"	6'-6"
0 - 12'	21 - 24"	5'-0"	0'-7 1/2"	6'-6"
OVER 12'	TO 18"	7'- 0"	0'-6"	9'-6"
OVER 12'	21" - 24"	7'- 0"	0'-7 1/2"	9'-6"

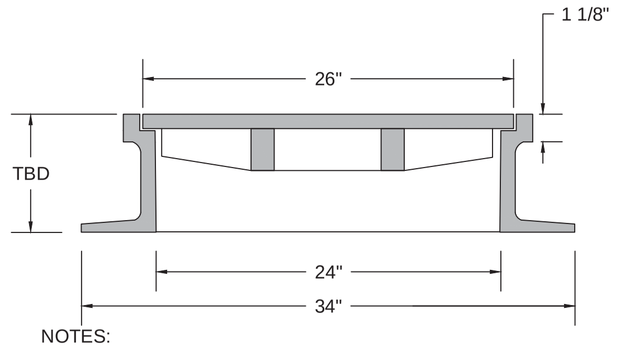
TYPICAL TRENCH DETAIL FOR SEWER PIPE
SCALE: N.T.S.



NOTES:

1. TYPICAL SANITARY MANHOLE TO BE 4 FEET IN DIAMETER.
2. 5'-0" DIAMETER FOR ALL MANHOLE DEPTHS GREATER THAN 12 FEET OR WHEN ORDERED BY THE ENGINEER.
3. 6" MIN. WALL THICKNESS AND 7" MIN. BASE THICKNESS WITH 5'-0" DIAMETER MANHOLES.
4. INNER EDGE OF BRICK TABLE TO BE AT ELEVATION OF CROWN OF TOP OF PIPE.
5. DESIGN LOAD - HS20.
6. ALL INVERTS SHALL BE 4,000 PSI CEMENT CONCRETE IN VOID AREAS AND RED SEWER BRICK CONSTRUCTION.
7. INVERTS SHALL NOT BE BUILT ABOVE GRADE. ALL INVERTS SHALL BE BUILT IN PLACE AFTER ALL PIPES HAVE BEEN INSTALLED.

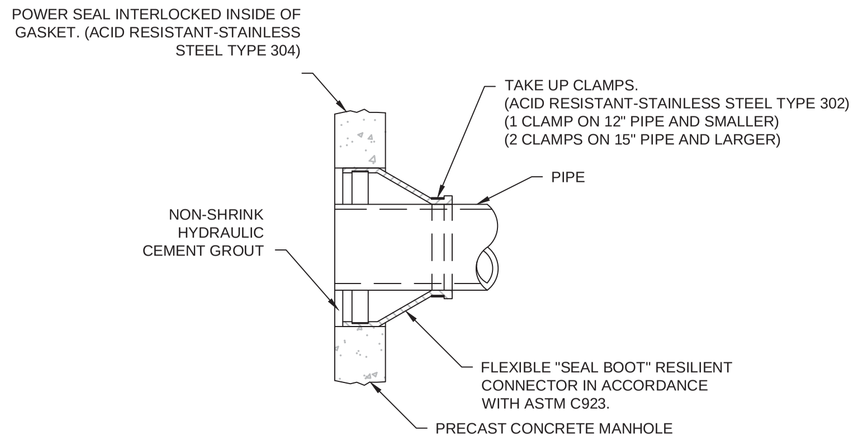
TYPICAL SEWER MANHOLE
SCALE: N.T.S.



NOTES:

1. FRAME AND COVER SHALL BE HEAVY DUTY, 24 INCH DIAMETER, MARBLEHEAD PATTERN AS MANUFACTURED BY ej OR APPROVED EQUAL.
2. EACH COVER SHALL READ SEWER IN 3" LETTERING.
3. FRAME AND COVER SHALL BE SET IN FULL BED OF MORTAR.
4. FRAME HEIGHT TO BE DETERMINED BY CONTRACTOR.

STANDARD SEWER MANHOLE FRAME AND COVER
SCALE: N.T.S.



TYPICAL SEWER MANHOLE SEAL
SCALE: N.T.S.

608744_HD(PUMP_STATION).DWG Plotted on 1-May-2025 12:09 PM
Proposal No. 608744-134912
A008860 - 224

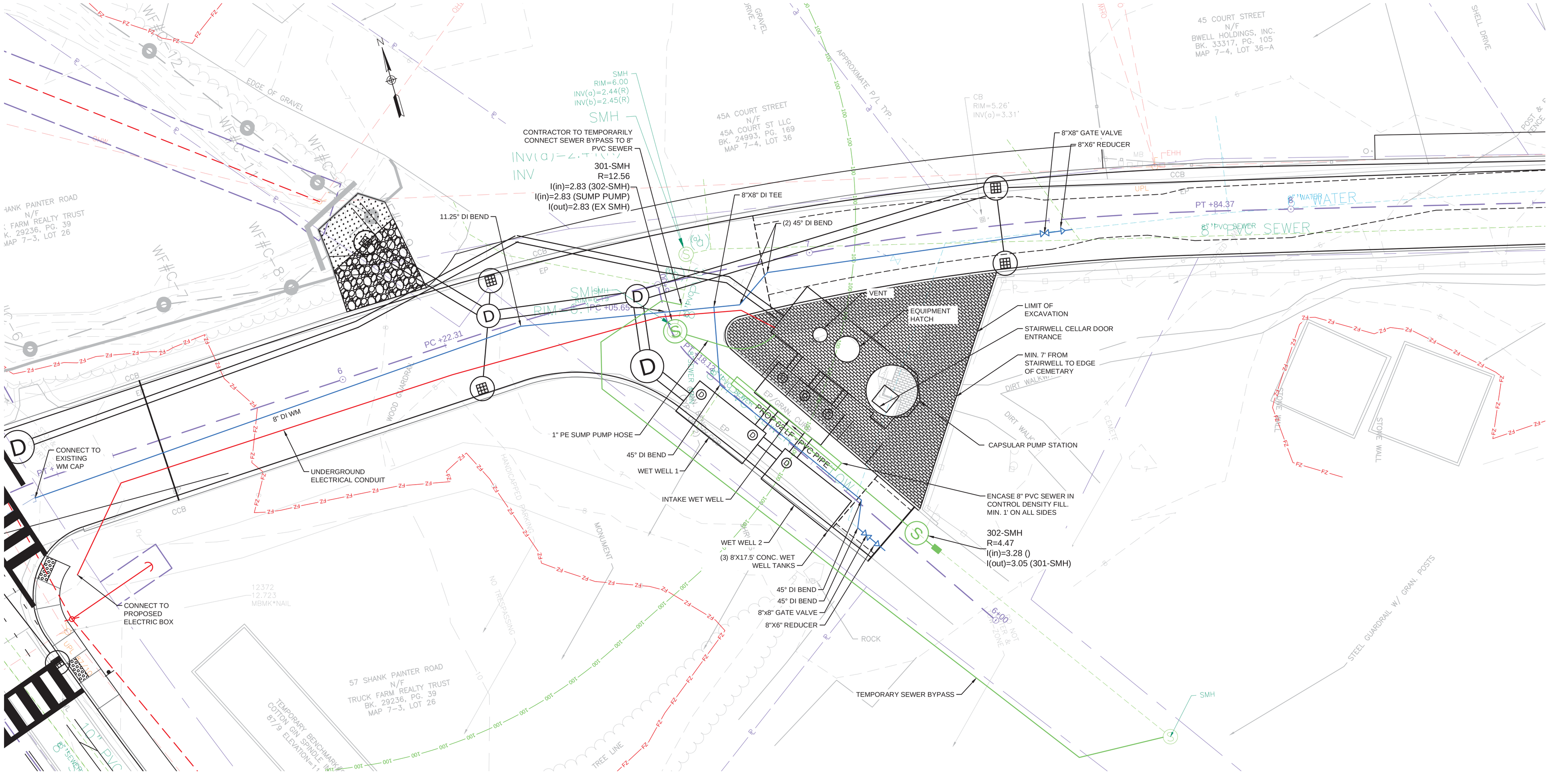
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	179	280
PROJECT FILE NO.	608744		

PUMP STATION PLANS AND DETAILS - 01

NOTES:

1. ALL STATIONS AND OFFSETS ARE MEASURED AT THE CENTER OF STRUCTURES.
2. ALL RIM AND INVERT INFORMATION IS BASED OFF TOPOGRAPHIC SURVEY. CONTRACTOR TO FIELD VERIFY ALL INFORMATION AND REPORT ANY INCONSISTENCIES TO THE ENGINEER FOR RESOLUTION.
3. SANITARY STRUCTURES (SMH) BOLTED OR SEALED SHUT SHALL BE REPORTED TO THE TOWN PRIOR TO REMOVING THE COVERS AS NEEDED TO PERFORM ADJACENT ROADWAY WORK.
4. ALL DRAINAGE STRUCTURES AND PIPES PROPOSED TO BE RETAINED AND/OR UTILIZED WITHIN THE PROJECT LIMITS AND AS DIRECTED BY THE ENGINEER SHALL BE CLEANED OF ALL SEDIMENT AND DEBRIS TO THE SATISFACTION OF THE ENGINEER.
5. REFER TO UTILITY SHEET PLANS FOR DRAINAGE PIPE AND STRUCTURE INFORMATION.



608744_HD(PUMP_MECH).DWG Plotted on 5-May-2025 5:10 PM
Proposal No. 608744-136412
A008860 - 225

PROCESS MECHANICAL NOTES

1. THE REQUIREMENTS INCLUDED IN THESE NOTES ARE SUPPLEMENTARY TO THE CONTRACT, GENERAL CONDITIONS, TECHNICAL REQUIREMENTS, AND OTHER REQUIREMENTS SPECIFIED HEREIN.
2. MOUNTING DETAILS PROVIDED ARE GENERIC FOR EQUIPMENT AND DEVICES OF VARIOUS MANUFACTURERS. THE CONTRACTOR MUST STRICTLY COMPLY WITH MANUFACTURER'S INSTRUCTION IN THE INSTALLATION OF THESE DEVICES. IF THERE ARE ANY ENGINEERING ISSUES THEY MUST BE REFERRED TO THE ENGINEER PRIOR TO INSTALLATION.
3. ALL MECHANICAL LAYOUTS ARE GENERALLY DIAGRAMMATIC AS SHOWN ON THESE DRAWINGS. THE WORK OF THE VARIOUS TRADES SHALL BE COORDINATED TO AVOID INTERFERENCE AND TO SECURE MAXIMUM HEAD ROOM. PARTICULAR ATTENTION IS DRAWN TO CONGESTED SPACES INSIDE AND OUTSIDE OF THE STRUCTURES. IF, IN THE INTEREST OF COORDINATION AND EXPEDIENCY, IT BECOMES NECESSARY TO DEVELOP "INTERFERENCE DRAWINGS" (DEFINED AS DRAWINGS EMBODYING THE WORK OF TRADES INVOLVED, ILLUSTRATING DETAILS OR CONSTRUCTION PROPOSED BY THE CONTRACTOR AND ARRANGEMENT OF ACTUAL EQUIPMENT AND APPARATUS PURCHASED), SUCH DRAWINGS SHALL BE PREPARED BY THE CONTRACTOR AND SHALL BE COORDINATED WITH OTHER TRADES AT NO ADDITIONAL EXPENSE TO THE OWNER
4. IT IS NOT THE INTENT OF THESE DRAWINGS TO PORTRAY EVERY DETAIL OF THE REQUIRED WORK. THE CONTRACTOR SHALL PROVIDE THE EQUIPMENT AND SYSTEMS COMPLETE SO THAT WHEN ASSEMBLED AND INSTALLED IN THE WORK, THEY SHALL OPERATE AND PERFORM AS DESCRIBED HEREIN.
5. COORDINATE THE WORK REQUIRED BY THESE DRAWINGS ("M" SERIES) WITH THE WORK REQUIRED BY OTHER DRAWINGS, ALL TRADES, AND THE ENGINEER.
6. ALL WALL AND FLOOR SLEEVES SHALL BE LARGE ENOUGH TO ACCOMMODATE FLANGES AS REQUIRED. FLOOR SLEEVES SHALL PROJECT AT LEAST 4-IN ABOVE FINISH FLOOR UNLESS OTHERWISE SHOWN. IF SLEEVES ARE TO BE SEALED, PROVIDE GROOVED COUPLING PIPING CONNECTION TO FACILITATE INSTALLATION AND REMOVAL OF PIPING.
7. ALL PIPE PENETRATIONS THROUGH INTERIOR AND EXTERIOR WALLS AND FLOORS SHALL BE SEALED WATERTIGHT.
8. SMALL PIPING (SAMPLE, SERVICE WATER, ETC.) IS SHOWN DIAGRAMMATICALLY: FIELD-ROUTING SUBJECT TO APPROVAL OF THE ENGINEER. SMALL PIPE ROUTING MUST NOT INTERFERE WITH ACCESS TO OR OPERATION OF ANY OTHER PIPE, VALVE OR EQUIPMENT.
9. ALL PROCESS EQUIPMENT SHALL BE ISOLATED FROM PIPING LOADS AND DYNAMICS BY FLEXIBLE CONNECTORS IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS AND SPECIFICATIONS.
10. ALL PIPING, VALVES, EQUIPMENT, ETC. SHALL BE LABELED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE LOCATION FOR ALL WALL PENETRATIONS WITH THE VARIOUS TRADES. WALL PIPES AND WALL SLEEVES SHALL BE REQUIRED FOR ALL PIPE PENETRATIONS THROUGH CONCRETE WALLS WHETHER SHOWN ON THE DRAWINGS OR NOT. ALL WALL AND FLOOR SLEEVES SHALL BE LARGE ENOUGH TO ACCOMMODATE FLANGES, IF REQUIRED.
12. CONTRACTOR SHALL PROVIDE RESTRAINT OF ALL EXPANSION JOINTS/FLEX CONNECTORS WITH TIE-RODS.
13. PROVIDE EXPANSION JOINTS WITH CONTROL RODS FOR ALL EXPOSED PIPING CROSSING STRUCTURAL EXPANSION JOINTS.
14. ALL SLEEVE TYPE COUPLINGS ON PRESSURE PIPING SHALL BE HARNESSED UNLESS OTHERWISE INDICATED. WHERE COUPLINGS ARE PROVIDED TO PROVIDE AXIAL FLEXIBILITY, PIPING MUST BE SECURELY RESTRAINED.
15. MATERIALS AND WORKMANSHIP FURNISHED UNDER THIS CONTRACT SHALL BE A STANDARD, HIGH-GRADE QUALITY, AND OF THE BEST WORKMANSHIP AND DESIGN. ALL LIKE PARTS OF EQUIPMENT OF THE SAME SIZE OR CAPACITY SHALL BE INTERCHANGEABLE. SUITABLE PROVISION SHALL BE MADE FOR EASY ADJUSTMENT OR REPLACEMENT OF ALL PARTS REQUIRING ADJUSTMENT OR REPLACEMENT.
16. THE INSTALLATION OF FACILITIES AND APPURTENANT WORK SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF ALL FEDERAL, STATE, AND MUNICIPAL CODES AND REGULATIONS GOVERNING THE WORK. IN INSTANCES WHERE THE REQUIREMENT OF DRAWINGS AND SPECIFICATIONS ARE IN EXCESS OF THE REQUIREMENTS OF THE APPLICABLE CODES AND REGULATIONS, AND ARE PERMITTED THEREUNDER, THEN, IN SUCH INSTANCES, THE REQUIREMENTS OF THE CONTRACT DOCUMENTS SHALL GOVERN, UNLESS DIRECTED OTHERWISE IN WRITING BY THE ENGINEER.
17. UNLESS OTHERWISE SPECIFIED, NEAT BRASS PLATE, OR OTHERWISE SUITABLE MATERIAL, HAVING THE SERIAL NUMBER, THE MAKE, HORSEPOWER, CAPACITY, SPEED, AND OTHER PERTINENT DATA, AND ANY IMPORTANT OPERATING OR MAINTENANCE INSTRUCTIONS, PERMANENTLY AND CLEARLY MARKED ON THE PLATE, SHALL BE MOUNTED ON EACH ITEM OF EQUIPMENT. ALL IMPORTANT PARTS OF EQUIPMENT, AS DIRECTED BY ENGINEER/OWNER SHALL BE STAMPED FOR IDENTIFICATION AND LOCATION.
18. ALL NECESSARY ANCHOR BOLTS, NUTS, WASHERS, SETTING TEMPLATES, AND SUCH OTHER PARTS SHALL BE PROVIDED AS REQUIRED FOR THE PROPER INSTALLATION OF THE WORK, AND WHEREVER PRACTICABLE, THEY SHALL BE BUILT IN AS THE WORK PROGRESSES. THE PARTS SHALL BE OF THE MATERIALS SPECIFIED, AND WHERE NOT SPECIFIED OR INDICATED, THEY SHALL BE OF APPROVED TYPES AND MATERIALS FOR EACH APPLICATION. THE SETTING OF ANCHOR BOLTS BY DRILLING AND GROUTING WILL NOT BE PERMITTED.
19. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT CONFORMANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER, AS APPROVED, TRULY LEVEL AND PLUMB, AND SHALL BE PROVIDED COMPLETE WITH ALL NECESSARY PIPING, FITTINGS, VALVES, CONTROLS, WIRING, AND APPURTENANCES AND ACCESSORIES SO THE EQUIPMENT WILL BE LEFT COMPLETE AND IN SATISFACTORY WORKING CONDITION.
20. ALL WEDGES, SHIMS, FILLING PIECES, KEYS, PACKING, GROUT, OR OTHER MATERIALS NECESSARY TO PROPERLY ALIGN, LEVEL, AND SECURE APPARATUS IN PLACE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. ALL PARTS INTENDED TO BE PLUMB OR LEVEL MUST BE PROVEN EXACTLY SO. ANY GRINDING NECESSARY TO BRING PARTS TO PROPER BEARING AFTER ERECTION SHALL BE DONE AT THE EXPENSE OF THE CONTRACTOR.
21. THE CONTRACTOR SHALL PROVIDE ALL OPENINGS, CHANNELS, CHASES, ETC. AS REQUIRED TO COMPLETE THE WORK UNDER THIS CONTRACT, TOGETHER WITH THOSE REQUIRED BY OTHER CONTRACTORS.
22. CONTRACTOR SHALL SUBMIT PIPING OR DUCT LAYOUT DIAGRAMS TO THE ENGINEER FOR APPROVAL PRIOR TO ANY PIPING OR DUCT INSTALLATION. LAYOUT DIAGRAMS SHALL SHOW DIMENSIONS OF ALL VALVES, FITTINGS, PIPE RUNS, AND SUPPORTS.
23. ALL PIPING SYSTEMS AND EQUIPMENT SHALL BE ADEQUATELY AND SAFELY SUPPORTED. CONTRACTOR SHALL DESIGN, PROVIDE, AND INSTALL ALL SUPPORTS AS REQUIRED BY THE PIPING AND EQUIPMENT PROVIDED. AT A MINIMUM, ALL PIPING SYSTEMS SHALL BE SUPPORTED PER THE REQUIREMENTS OF MANUFACTURER'S STANDARDIZATION SOCIETY (MSS) SP-58 AND MSS SP-69. SUPPORT DESIGN SHALL ACCOMMODATE ALL STATIC AND OPERATIONAL CONDITIONS TO WHICH THE PIPING AND EQUIPMENT MAY BE SUBJECTED. SUPPORTS SHALL BE IN ADDITION TO THOSE SHOWN ON THE CONTRACT DRAWINGS. PIPE SUPPORTS SHALL BE TIED INTO THE STRUCTURAL CONCRETE SLAB.
24. ALL FIRE SEALANTS AND SEALING BY CONTRACTOR.
25. CONTRACTOR SHALL PROVIDE REDUCERS AND EXPANDERS AS REQUIRED TO CONNECT TO PROCESS WATER LINE TO EQUIPMENT.
26. STORMWATER PUMP STATION SHALL BE CAPSULAR PUMP STATION BY SMITH & LOVELESS, INC. OR APPROVED EQUAL.

PROCESS MECHANICAL LEGEND

VALVES, COUPLING, & APPURTENANCES

- BURIED GATE VALVE
- BURIED PLUG VALVE
- BALL VALVE
- BUTTERFLY VALVE
- ELECTRIC ACTUATED BUTTERFLY VALVE (M)
- BALL CHECK VALVE
- SWING CHECK VALVE
- WAFER CHECK VALVE
- PLUG VALVE
- NEEDLE VALVE
- SOLENOID VALVE (S)
- SLEEVE TYPE COUPLING
- SPLIT SLEEVE ADAPTER
- FLANGED COUPLING ADAPTER
- EXPANSION JOINT (METAL)
- FLEX CONNECTOR/EXPANSION JOINT (RUBBER)
- EXPANSION JOINT (REDUCING)
- MAGMETER
- TURBINE FLOWMETER
- PRESSURE REDUCING VALVE
- BACK PRESSURE VALVE
- VACUUM BREAKER
- RELIEF VALVE
- COMBINATION VALVE
- PRESSURE INDICATOR (LIQUID SERVICE) (PI)
- PRESSURE INDICATE TRANSMITTER (LIQUID SERVICE) (PIT)
- PRESSURE INDICATOR (AIR SERVICE) (PI)
- FLOW SWITCH (FS)
- PRESSURE SWITCH (PS)
- TEMPERATURE INDICATOR (T)
- SAMPLE TAP (S)
- SLIDE GATE WITH OPERATOR NUT
- SLIDE GATE
- REDUCER/INCREASER
- STRAINER
- UNION
- FLEXIBLE HOSE
- METERING PUMP (PUMP)
- ROTAMETER
- DIAPHRAGM ISOLATOR (GAUGE GUARD)
- VENT
- DRAIN (D)
- FLOAT SWITCH
- ULTRASONIC LEVEL SENSOR
- POSITIVE DISPLACEMENT BLOWER
- FILTER SILENCER
- AIR FILTER/INSECT SCREEN
- CENTRIFUGAL PUMP
- CENTRIFUGAL FAN/BLOWER
- VOLUME DAMPER (VD)
- ISOLATION DAMPER (ID)

REFER TO SHEET I-2 FOR ADDITIONAL SYMBOLS.

PIPE AND FITTINGS

DOUBLE LINE	SINGLE LINE	
		PIPE
SIDE, UP, DOWN	SIDE, UP, DOWN	ELBOW (90)
SIDE, UP, DOWN	SIDE, UP, DOWN	ELBOW (45)
SIDE, BRANCH DOWN, BRANCH UP, DOWN	SIDE, UP, DOWN	TEE
		WYE
		CROSS
		RED (CONC)
		RED (ECC)
		FLANGE
		PIPE END
		PIPE BREAK

PIPE AND FITTING SYMBOLOGY SHOWN ABOVE IS FOR FLANGED DUCTILE IRON PIPE. SYMBOLOGY FOR OTHER PIPING SYSTEMS IS SIMILAR. END CONNECTIONS DENOTE JOINING TECHNOLOGY.

- MECHANICAL JOINT
- FRP
- SOCKET WELD
- SINGLE LINE (JOINING TECHNOLOGY VARIES)

PIPING AND TUBING MATERIALS

CI	CAST IRON PIPE
CPVC	CHLORINATED POLYVINYL CHLORIDE PIPE
CS	CARBON STEEL
CU	COPPER
DI	DUCTILE IRON PIPE
FRP	FIBERGLASS REINFORCED PLASTIC PIPE
GALV	GALVANIZED STEEL
HDPE	HIGH DENSITY POLYETHYLENE
HOSE	FLEXIBLE HOSE
PE	POLYETHYLENE
PVC	POLYVINYL CHLORIDE
RCP	REINFORCED CONCRETE PIPE
SS	STAINLESS STEEL PIPE OR TUBING
STL	STEEL
XP	EXPLOSION PROOF

LINE DESIGNATIONS

- PROPOSED
- EXISTING, OTHER DISCIPLINE OR OUT OF FUNCTION
- UNDERGROUND OR BELOW ELEVATION IN VIEW

PROCESS STREAM ABBREVIATIONS

SS	SANITARY SEWER
FM	FORCE MAIN
OC	ODOR CONTROL
V	VENT
NPT	NATIONAL PIPE THREAD

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	180	288
PROJECT FILE NO.	608744		

PUMP STATION PLANS AND DETAILS - 02

608744_HD(PUMP_MECH).DWG Plotted on 14-Apr-2025 4:19 PM

Proposal No. 608744-136412

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PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	181	288
PROJECT FILE NO.	608744		

PUMP STATION PLANS AND DETAILS - 03

VALVE TABLE

TAG NO.	EQUIPMENT DESCRIPTION	LOCATION	TYPE	APPLICATION	SIZING		SERVICE	ACTUATOR	GATE/VALVE POSITION	REMARKS
					VALUE 1	UNIT 1				
PV-101	PUMP P-101 SUCTION PLUG VALVE	DRY WELL	PLUG VALVE	STORMWATER	14	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	
PV-102	PUMP P-102 SUCTION PLUG VALVE	DRY WELL	PLUG VALVE	STORMWATER	14	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	
PV-103	FUTURE PUMP SUCTION PLUG VALVE	DRY WELL	PLUG VALVE	STORMWATER	14	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	
CV-104	PUMP P-101 DISCHARGE CHECK VALVE	DRY WELL	CHECK VALVE	STORMWATER	8X12	INCHES	CHECK	MANUAL	NORMALLY OPEN	8" X 12" FULL BODY CHECK VALVE
CV-105	PUMP P-102 DISCHARGE CHECK VALVE	DRY WELL	CHECK VALVE	STORMWATER	8X12	INCHES	CHECK	MANUAL	NORMALLY OPEN	8" X 12" FULL BODY CHECK VALVE
PV-107	PUMP P-101 DISCHARGE PLUG VALVE	DRY WELL	PLUG VALVE	STORMWATER	12	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	
PV-108	PUMP P-101 DISCHARGE PLUG VALVE	DRY WELL	PLUG VALVE	STORMWATER	12	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	
PV-109	FUTURE PUMP DISCHARGE PLUG VALVE	DRY WELL	PLUG VALVE	STORMWATER	12	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	
CV-107	PUMP P-201 DISCHARGE CHECK VALVE	DRY WELL	CHECK VALVE	STORMWATER	2	INCHES	CHECK	MANUAL	NORMALLY OPEN	
BV-111	PUMP P-201 DISCHARGE BALL VALVE	DRY WELL	BALL VALVE	STORMWATER	2	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	
CV-112	PUMP P-202 DISCHARGE CHECK VALVE	DRY WELL	CHECK VALVE	STORMWATER	2	INCHES	CHECK	MANUAL	NORMALLY OPEN	
BV-113	PUMP P-202 DISCHARGE BALL VALVE	DRY WELL	BALL VALVE	STORMWATER	2	INCHES	OPEN/CLOSE	MANUAL	NORMALLY OPEN	

PUMP SCHEDULE

TAG NO.	EQUIPMENT DESCRIPTION	LOCATION	TYPE	FLOW		HEAD		DRIVER	MOTOR		VOLTAGE			REMARKS
				VALUE 1	UNIT 1	VALUE 2	UNIT 2		HP	RPM	VAC	Hz	PHASE	
P-101	STORMWATER PUMP	DRY WELL	FLOODED SUCTION	2000	GPM	50	TDH	CONSTANT	40	1170	460	60	3	PROVIDE STEEL BASE SET ON CONCRETE PEDESTAL
P-102	STORMWATER PUMP	DRY WELL	FLOODED SUCTION	2000	GPM	50	TDH	CONSTANT	40	1170	460	60	3	PROVIDE STEEL BASE SET ON CONCRETE PEDESTAL
P-201	SUMP PUMP	DRY WELL	SUMP PUMP	40	GPM	20	TDH	CONSTANT	3/10	1550	230	60	1	
P-202	SUMP PUMP	DRY WELL	SUMP PUMP	40	GPM	20	TDH	CONSTANT	3/10	1550	230	60	1	

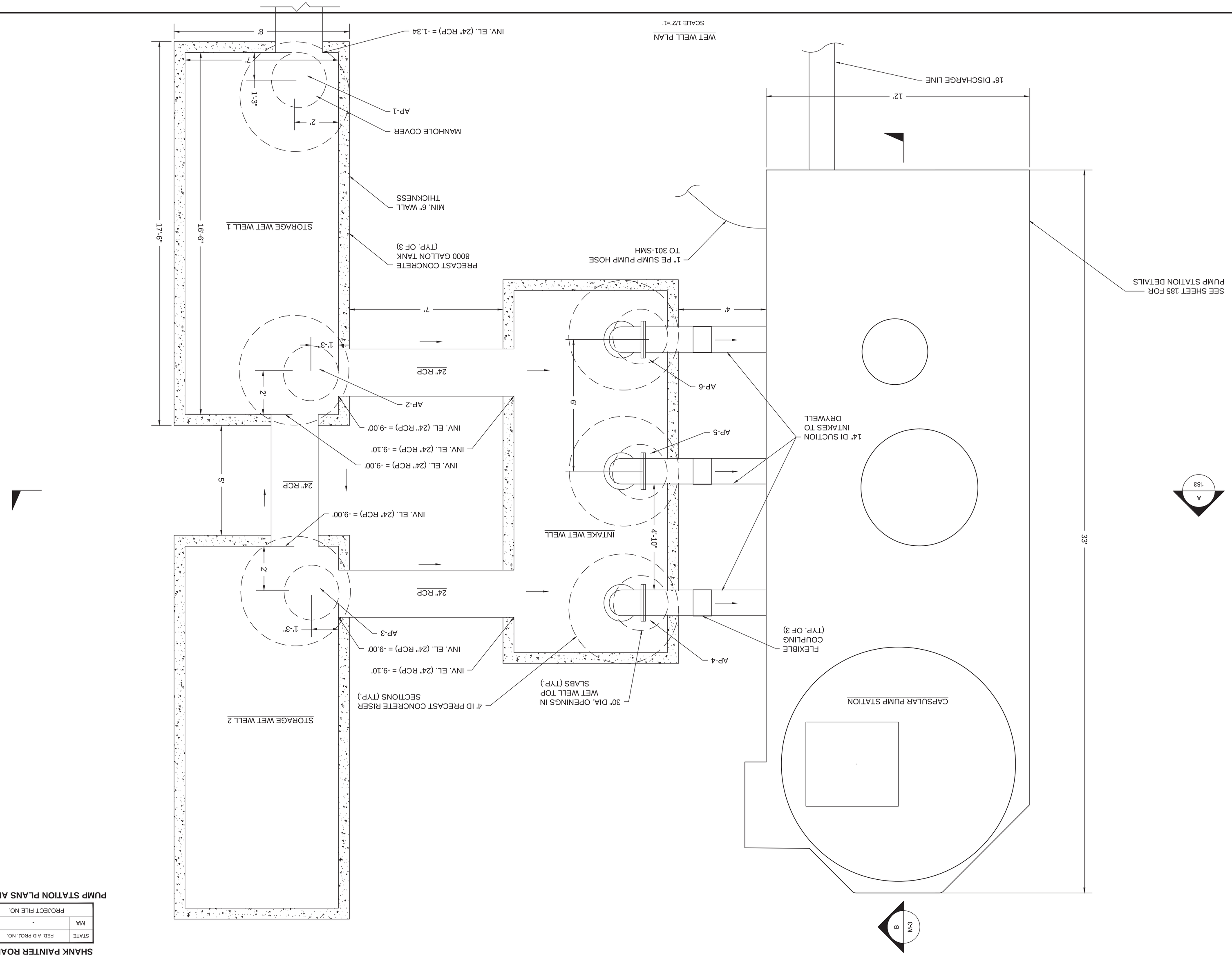
PRESSURE GAUGE SCHEDULE

TAG NO.	EQUIPMENT DESCRIPTION	LOCATION	TYPE	REMARKS
PI-101	PUMP P-101 DISCHARGE PRESSURE GAUGE	PUMP ROOM/DRY PIT	DIRECT MOUNTING, INDICATING DIAL	PROVIDE DIAPHRAGM SEALS
PI-102	PUMP P-102 DISCHARGE PRESSURE GAUGE	PUMP ROOM/DRY PIT	DIRECT MOUNTING, INDICATING DIAL	PROVIDE DIAPHRAGM SEALS
PI-103	PUMP P-101 SUCTION LINE PRESSURE GAUGE	PUMP ROOM/DRY PIT	DIRECT MOUNTING, INDICATING DIAL	PROVIDE DIAPHRAGM SEALS
PI-104	PUMP P-102 SUCTION LINE PRESSURE GAUGE	PUMP ROOM/DRY PIT	DIRECT MOUNTING, INDICATING DIAL	PROVIDE DIAPHRAGM SEALS
PIT-301	DISCHARGE LINE PRESSURE INDICATING TRANSMITER	PUMP ROOM/DRY PIT	DIRECT MOUNTING, INDICATING DIAL	PROVIDE DIAPHRAGM SEALS

VENTILATION SCHEDULE

TAG NO.	EQUIPMENT DESCRIPTION	LOCATION	TYPE	REMARKS
AB-101	AIR BLOWER 101 VENTILATION SYSTEM	ABOVE GRADE		

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AM0860 - 227



PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6
PUMP STATION PLANS AND DETAILS - 04

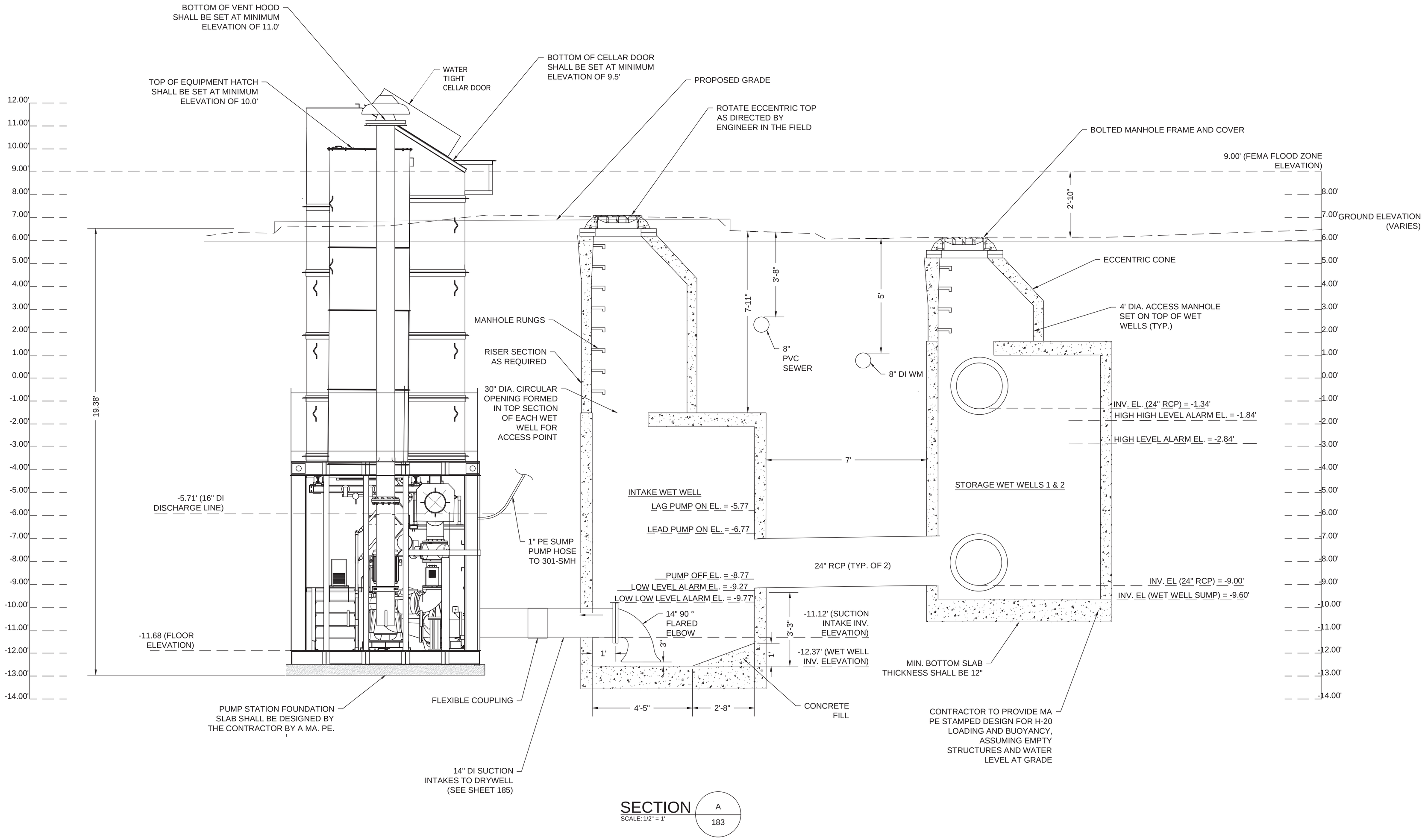
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	182	288
PROJECT FILE NO.	608744		

Proposal No. 608744-136412
608744_HD(PUMP_MECH).DWG Plotted on 14-Apr-2025 4:19 PM
A00690V 228

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	183	288
PROJECT FILE NO.	608744		

PUMP STATION PLANS AND DETAILS - 05



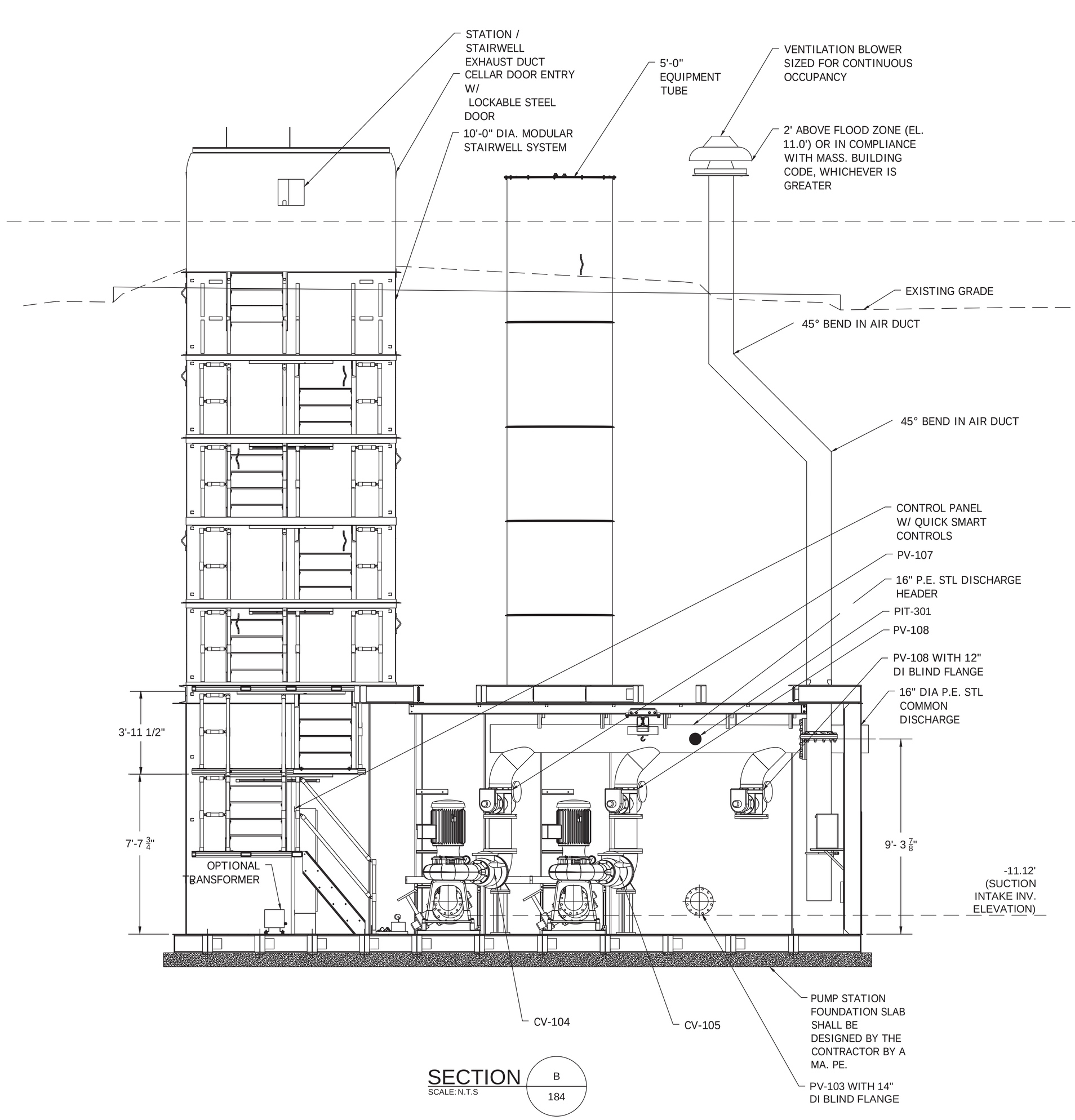
SECTION A
SCALE: 1/2" = 1'
183

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Proposal No. 608744-184412
AM08860 - 229

PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	184	288
PROJECT FILE NO.	608744		

PUMP STATION PLANS AND DETAILS - 06



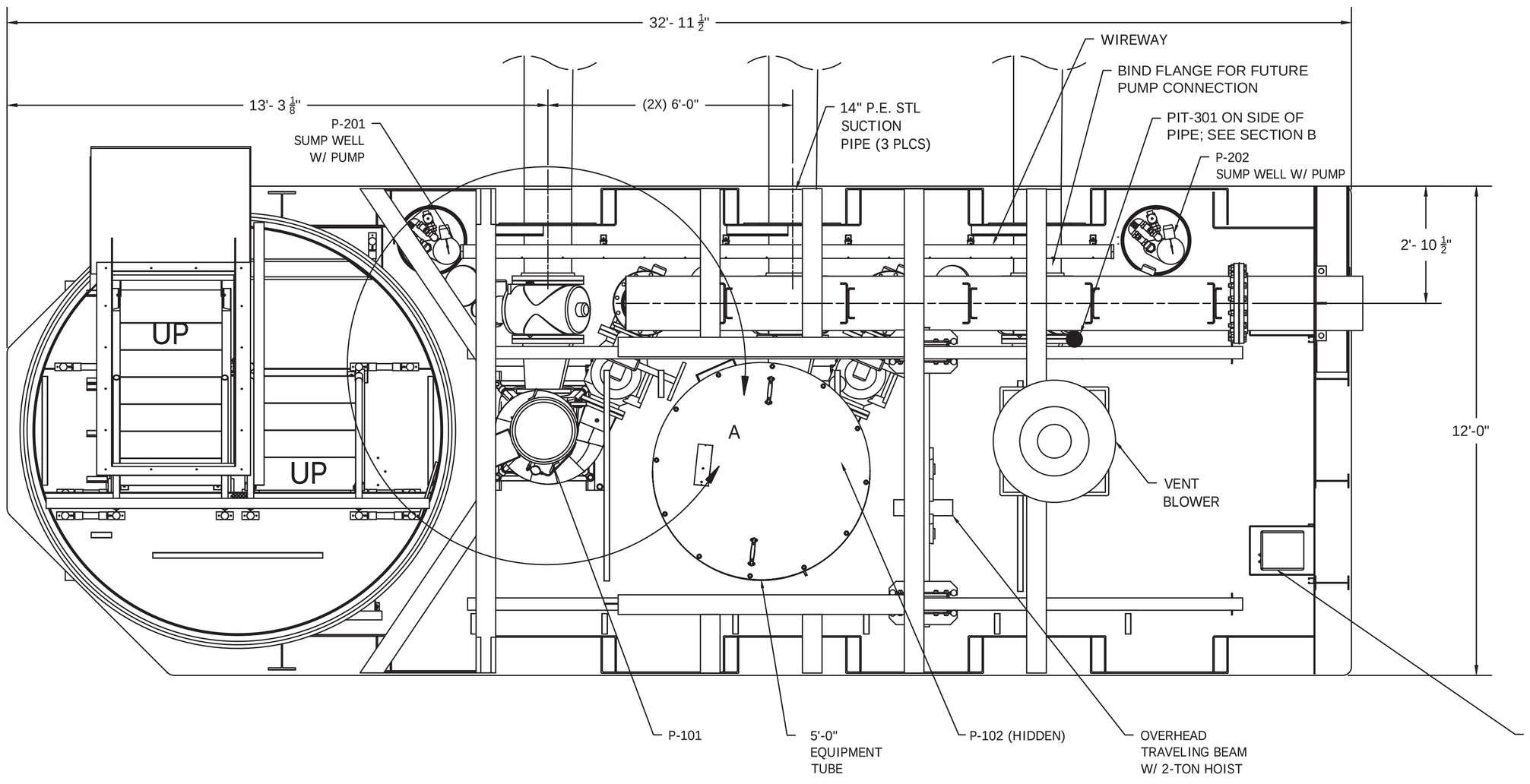
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Proposal No. 608744-134912
AM8860 - 230

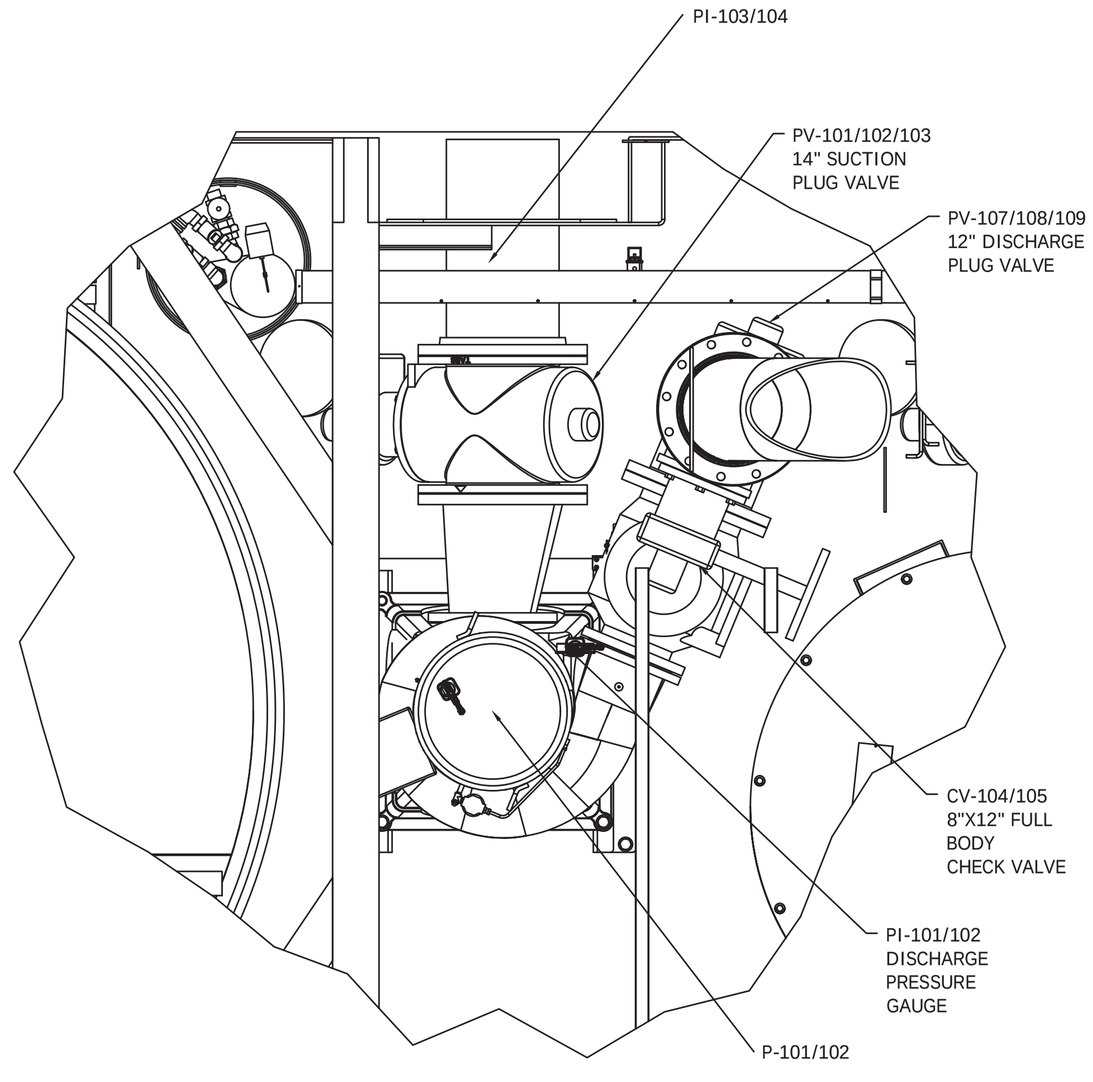
PROVINCETOWN
SHANK PAINTER ROAD & ROUTE 6

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	185	288
PROJECT FILE NO.	608744		

PUMP STATION PLANS AND DETAILS - 07



PLAN VIEW
SCALE: NTS

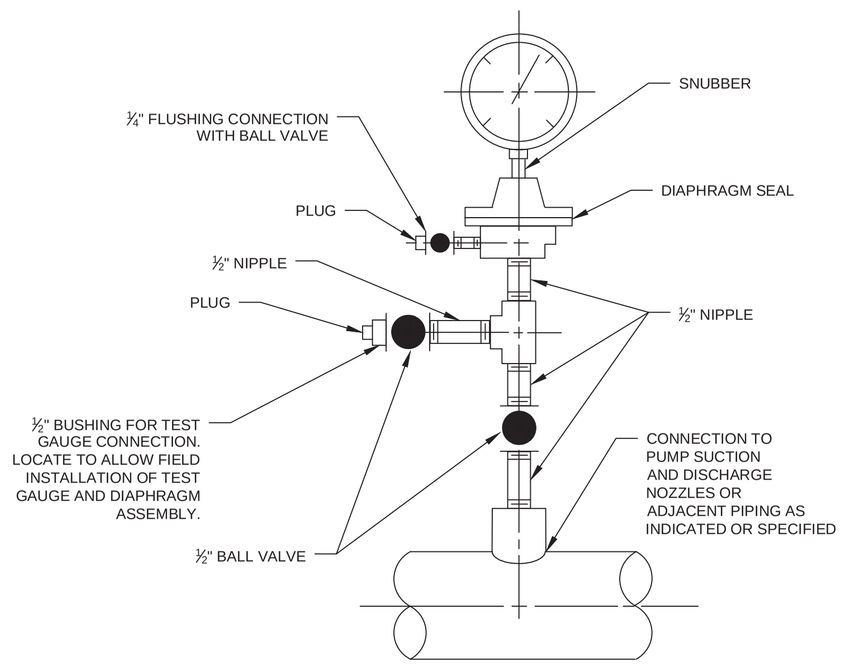


DETAIL A
(TYP. PUMP LAYOUT)

NOTES:
1. CAPSULAR PUMP STATION IS BASED AROUND SMITH AND LOVELESS, IN. DESIGN.

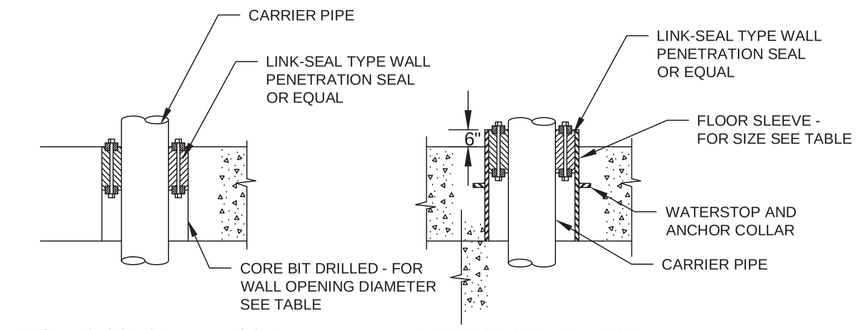
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Proposal No. 608744-136412
A008860 - 231

608744_HD(PUMP_MECH).DWG Plotted on 14-Apr-2025 4:20 PM
Proposal No. 608744-136412
A008860 - 232



PRESSURE GAUGE MOUNTING DETAIL FOR LIQUID PIPING

SCALE: N.T.S.



EXISTING CONCRETE FLOOR NEW CONCRETE FLOOR

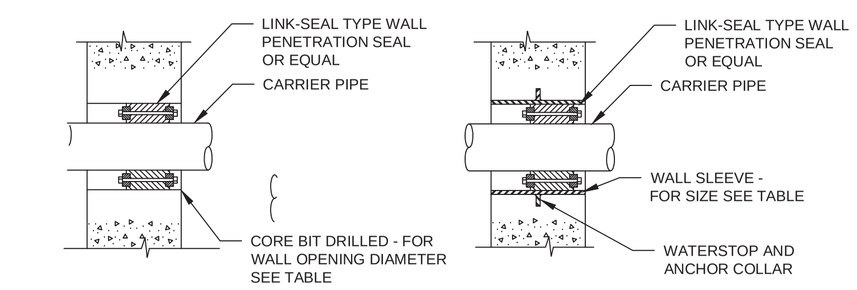
CARRIER PIPE NOMINAL SIZE	CARRIER PIPE O.D.	FLOOR SLEEVE SIZE	CORE DRILLED I.D.
1 1/2"	1.625"	3"	3"
2"	2.50"	4"	4"
4"	4.80"	8"	8"
6"	6.90"	10"	10"
8"	9.05"	12"	12"
16"	17.40"	20"	20"
18"	19.50"	24"	24"
24"	25.80"	30"	29"

NOTES:

1. SIZES SHOWN ARE FOR DUCTILE IRON PIPE, FOR OTHER MATERIALS AND PIPE SIZES CONSULT MANUFACTURER'S SPECIFICATIONS.
2. FOR WATER-TIGHT AND GAS-TIGHT APPLICATIONS, PROVIDE NON-SHRINK GROUT ON BOTH SIDES.

TYPICAL PIPE SLAB PENETRATION DETAIL

SCALE: N.T.S.



EXISTING CONCRETE WALL NEW CONCRETE WALL

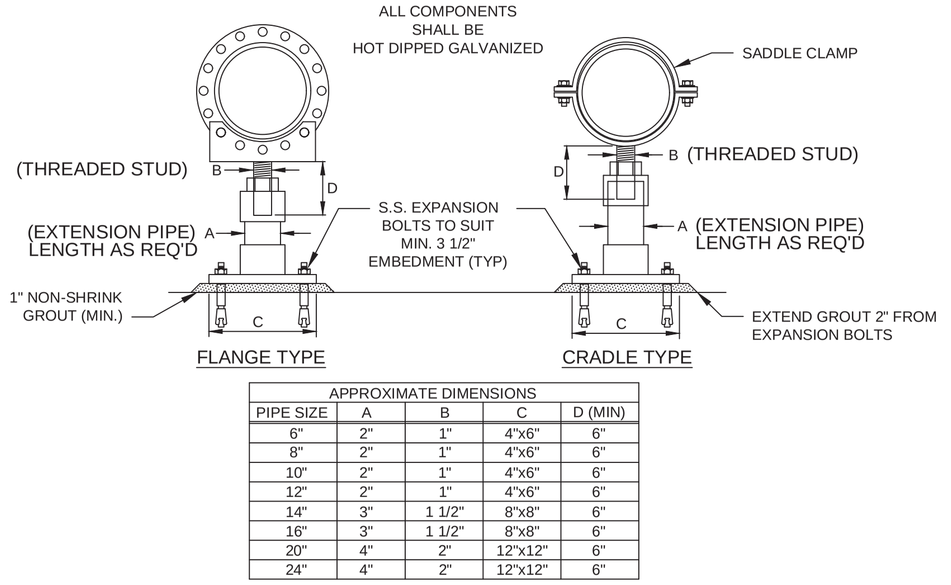
CARRIER PIPE NOMINAL SIZE	CARRIER PIPE O.D.	WALL SLEEVE SIZE	CORE DRILLED I.D.
2"	2.50"	4"	4"
4"	4.80"	8"	8"
6"	6.90"	10"	10"
8"	9.05"	12"	12"
16"	17.40"	20"	20"
18"	19.50"	24"	24"
24"	25.80"	30"	29"

NOTES:

1. SIZES SHOWN ARE FOR DUCTILE IRON PIPE, FOR OTHER MATERIALS AND PIPE SIZES CONSULT MANUFACTURER'S SPECIFICATIONS.
2. SOME APPLICATIONS MAY REQUIRE STANDARD WALL CASTINGS.
3. FOR WATER-TIGHT AND GAS-TIGHT APPLICATIONS, PROVIDE NON-SHRINK GROUT ON BOTH SIDES.

TYPICAL WALL PENETRATION DETAIL

SCALE: N.T.S.



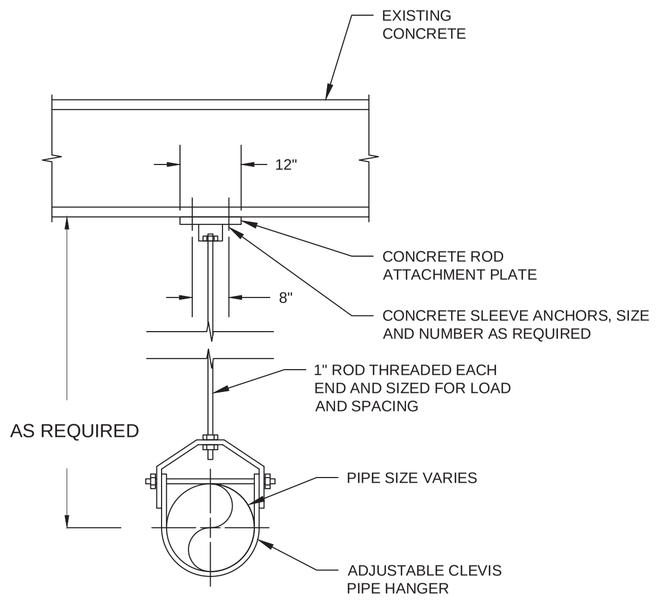
APPROXIMATE DIMENSIONS				
PIPE SIZE	A	B	C	D (MIN)
6"	2"	1"	4"x6"	6"
8"	2"	1"	4"x6"	6"
10"	2"	1"	4"x6"	6"
12"	2"	1"	4"x6"	6"
14"	3"	1 1/2"	8"x8"	6"
16"	3"	1 1/2"	8"x8"	6"
20"	4"	2"	12"x12"	6"
24"	4"	2"	12"x12"	6"

ADJUSTABLE PIPE SUPPORT DETAIL

SCALE: N.T.S.

NOTES:

1. SIZES SHOWN ARE FOR DUCTILE IRON PIPE, FOR OTHER MATERIAL AND PIPE SIZES CONSULT MANUFACTURER'S SPECIFICATIONS. REFER TO SECTION 11200 FOR ADDITIONAL REQUIREMENTS.
2. PIPE SUPPORT CALCULATIONS SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 11200.
3. ALL COMPONENTS OF PIPE SUPPORT SYSTEM (EXCEPT EXPANSION BOLTS) SHALL BE HOT-DIPPED GALVANIZED STEEL.

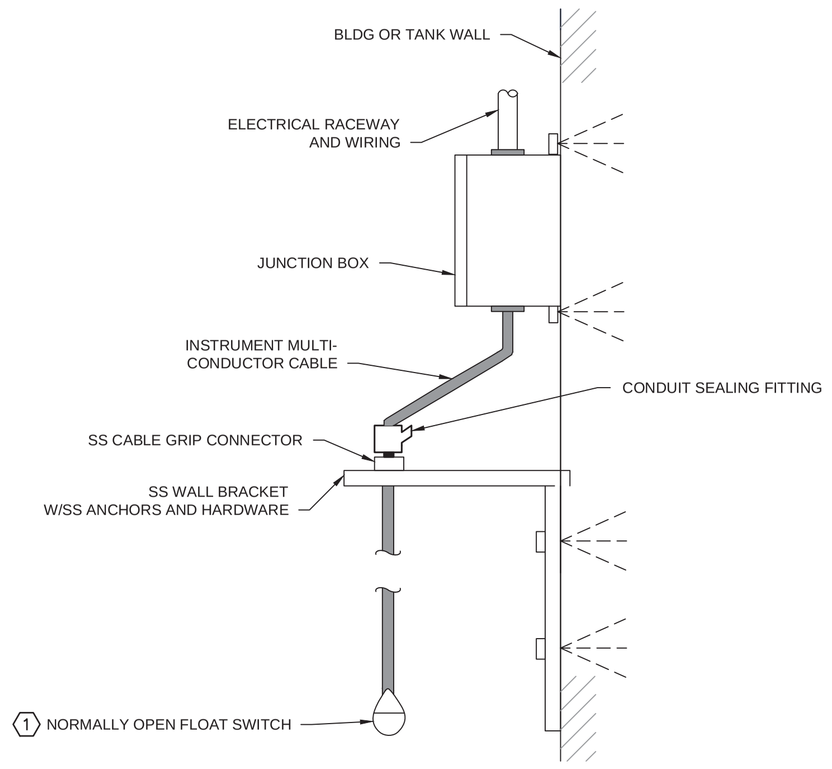


PIPE HANGER DETAIL

SCALE: N.T.S.

NOTES:

1. FOR PIPE SIZES CONSULT MANUFACTURER'S SPECIFICATIONS. REFER TO SECTION 11200 FOR ADDITIONAL REQUIREMENTS.
2. PIPE SUPPORT CALCULATIONS SHALL BE PROVIDED IN ACCORDANCE WITH SECTION 11200.
3. ALL COMPONENTS OF PIPE SUPPORT SYSTEM (EXCEPT EXPANSION BOLTS) SHALL BE HOT-DIPPED GALVANIZED STEEL.



NOTES:

1. ALL COMPONENTS SHALL BE RATED FOR CLASS I DIVISION 1 AREAS FOR EXPLOSION PROOF ENVIRONMENTS.
2. CONTRACTOR TO SUPPLY AND INSTALL ALL DIVISION 16 DEVICES, EQUIPMENT, COMPONENTS, AND ANCILLARY ITEMS ASSOCIATED WITH POWER AND SIGNAL WIRING FOR I&C DEVICES.
3. THE MOUNTING DETAILS PROVIDED ARE GENERIC FOR LEVEL SWITCH DEVICES OF VARIOUS MANUFACTURERS. THE INSTALLING CONTRACTOR MUST STRICTLY COMPLY WITH MANUFACTURER'S INSTRUCTION IN THE INSTALLATION OF THESE DEVICES. IF THERE ARE ANY ENGINEERING ISSUES THEY MUST BE REFERRED TO THE ENGINEER PRIOR TO INSTALLATION.

FLOAT SWITCH DETAIL

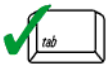
SCALE: N.T.S.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.





A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

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Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Maria George 7/30/2025
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

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Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- [X] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [X] Reduced Impervious Area (Redevelopment Only)
- [X] Minimizing disturbance to existing trees and shrubs
- [ ] LID Site Design Credit Requested:
  - [ ] Credit 1
  - [ ] Credit 2
  - [ ] Credit 3
- [X] Use of “country drainage” versus curb and gutter conveyance and pipe
- [ ] Bioretention Cells (includes Rain Gardens)
- [ ] Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- [ ] Treebox Filter
- [X] Water Quality Swale
- [X] Grass Channel
- [ ] Green Roof
- [ ] Other (describe): _____

Standard 1: No New Untreated Discharges

- [X] No new untreated discharges
- [X] Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- [X] Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

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Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- [X] Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- [ ] Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- [X] Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm. Redevelopement project: compliance met to the maximum extent practicable.

Standard 3: Recharge

- [ ] Soil Analysis provided.
- [X] Required Recharge Volume calculation provided.
- [ ] Required Recharge volume reduced through use of the LID site Design Credits.
- [ ] Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - [ ] Static [ ] Simple Dynamic [ ] Dynamic Field[1]
- [ ] Runoff from all impervious areas at the site discharging to the infiltration BMP.
- [ ] Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- [ ] Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- [X] Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - [ ] Site is comprised solely of C and D soils and/or bedrock at the land surface
  - [ ] M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - [ ] Solid Waste Landfill pursuant to 310 CMR 19.000
  - [X] Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- [X] Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- [ ] Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

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Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

STORMWATER REPORT

Date: July 30, 2025

To **Town of Provincetown Conservation Commission**

From Ryan J. Paul, P.E., Apex Companies

CC Maria E. George, P.E., Apex Companies
Lauren K. Howe-Januzzi, E.I.T, Apex Companies

Subject **Shank Painter Road and Route 6 Reconstruction Project**
Town of Provincetown, MA
WPA Form 3 – Notice of Intent

Apex Companies (Apex, formerly known as Environmental Partners) has prepared this stormwater report on behalf of the Town of Provincetown for the Wetlands Protection Act Notice of Intent for the Shank Painter Road and Route 6 Reconstruction Project. This report has been prepared in accordance with the requirements of 310 CMR 10.00 and 310 CMR 21.00, and the guidelines of the Massachusetts Stormwater Handbook.

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Project Description

Shank Painter Road and Route 6 Reconstruction

Shank Painter Road provides access between Route 6 and downtown Provincetown. Presently, the four-lane divided Route 6 corridor creates a barrier at the northern limit of Shank Painter Road making it challenging for bicyclists and pedestrians to reach popular recreational destinations along Route 6 such as the Cape Cod National Seashore, Herring Cove Beach, the Shank Painter Ponds and several trails. To improve pedestrian and bicycle connections between these destinations, Apex is proposing a combination of shared use paths, sidewalks, and narrowed vehicular travel lanes along Route 6 and Shank Painter Road. At the Route 6 - Shank Painter Road intersection, a roundabout is proposed to efficiently process and calm motorist traffic as it enters this final section of Route 6 and Cape Cod.

Additionally, Shank Painter Road and its surrounding properties regularly experience local flooding issues due to the small existing drainage network providing only minimal collection and conveyance. Apex is proposing a new stormwater management system along Shank Painter Road and Route 6 that combines the installation of new catch basins, conveyance piping, subsurface infiltration chambers, and a new infiltration basin and sedimentation forebay to provide improved drainage management.

Court Street Flood Mitigation

Most notably, the Town has concerns regarding the significant flooding occurring on Court Street, a mixed commercial and residential street that intersects with Shank Painter Road. The area has been experiencing flooding depths greater than 6” of standing water occur during intense storms, and greater depths have been found under modelled severe storms. This localized flooding constantly impacts surrounding property owners and traffic. The flood area is located at the west end of Court Street near the intersection with Winthrop Street. In front of 45 Court Street is a low point where runoff from Shank Painter Road, Winthrop Street, Holway Avenue, and Court Street stormwater collects. The flooding area is shown on Photos 1 and 2.



Photo 1: Flooding Area Overview



Photo 2: Flooding Area Street View (12/5/20)

In February 2021, Apex prepared a preliminary design memo discussing design alternatives for the flooding issue on Court Street. The resulting recommendation was to install a stormwater pump station, which would allow for mitigation of the flooding within site restrictions. Refer to the alternatives analysis section and Attachment 1.1 for additional information. Since the forcemain is proposed to run along Shank Painter Road and eventually outlet to Duck Pond, it was determined that this Court Street Flood Mitigation Project would be tied in with the Shank Painter Road and Route 6 Reconstruction Project.

This project is a MassDOT SHLO project. All proposed work on Route 6 will occur within the stations 140+00 and 188+00 according to MassDOT State Highway Layouts #7727-7 and #7727-8. The Shank Painter Road and Route 6 Reconstruction project is being pursued by the Town through MassDOT's Transportation Improvement Program (TIP).

The full extents of the project limits are shown in Figure 1.



Figure 1: Shank Painter Road and Route 6 Reconstruction Project Limits

Drainage Summary

For simplicity, we have divided this analysis into 6 major catchment areas with multiple outfalls in each catchment area. Refer to Figure 2 for an overview of the existing catchment areas, drainage features, wetland areas and outfall locations. Refer to Figure 3 for an overview of the proposed catchment areas and drainage features.

Zone 1: Route 6 Drainage

The Route 6 Drainage area includes a combination of country drainage and small, individual collection systems that outlet to separate existing outfalls along Route 6. The proposed mix use bike path will replace the south lane of route 6, reducing the paving width. There will be additional cut through sections from the north travel lane to the south mixed use path and bike lane. The result is an increase in impervious area of approximately 8,800 square feet (SF).

Zone 2: Outfall to Duck Pond off of Route 6

The Duck Pond catchment area includes all Subcatchments that flow to Duck Pond through an existing collection system that flows down Winslow Street, onto Jerome Smith Road, and eventually crosses Route 6 and outfalls to the Pond. There will be no changes to the drainage system in this zone. The only change will be a **decrease** of around 2960 SF in impervious pavement along Route 6 due to the new roundabout intersection design.

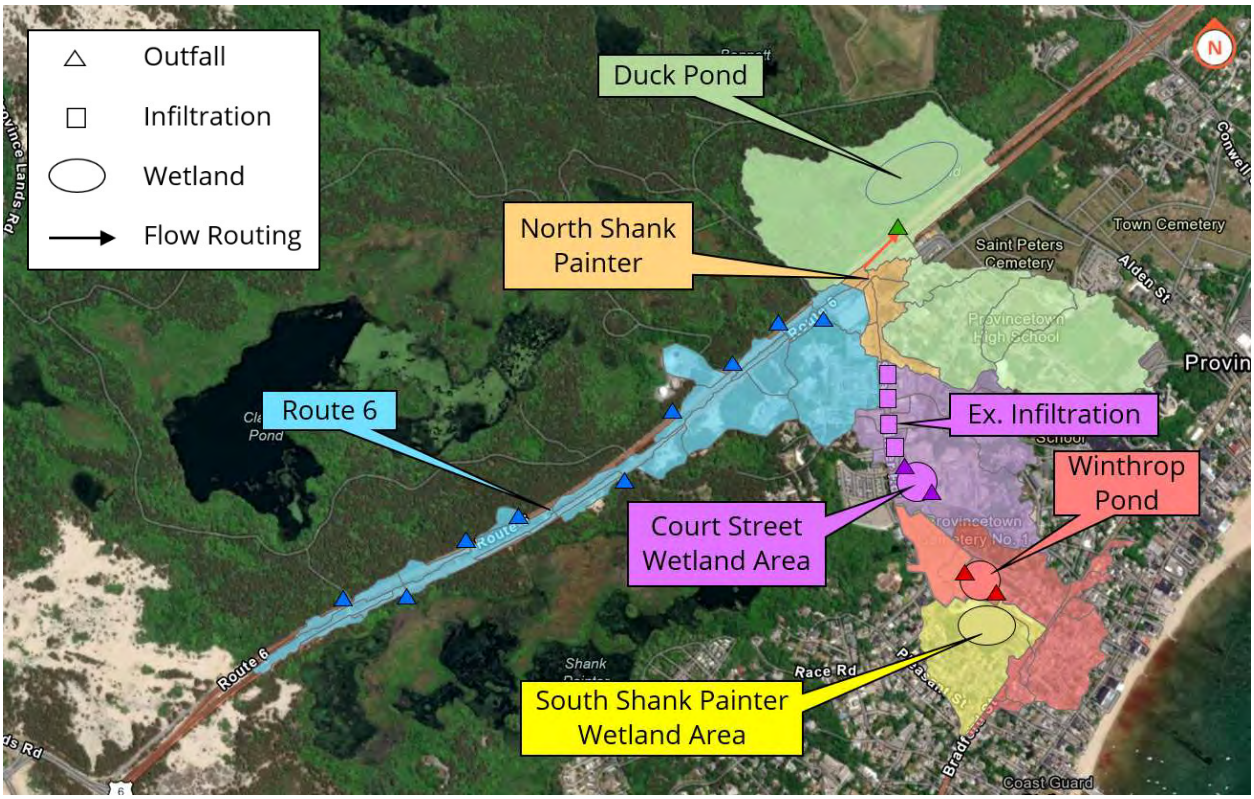


Figure 2: Existing Drainage Areas

Zones 3 – 6: Shank Painter Drainage

The existing drainage system on Shank Painter Road has multiple outfalls and onsite infiltration, and is split into four main zones:

- Zone 3: North Shank Painter Drainage
- Zone 4: Court Street Drainage
- Zone 5: South Shank Painter Drainage
- Zone 6: Winthrop Pond Drainage

There are several disconnected drywell systems that were installed along Shank Painter Road in the Zone 4: Court Street drainage area. These drywells were welded shut and were therefore unable to be inspected and measured. Their combined storage volume is estimated to be around 3,400 cubic feet (CF), assuming 6' diameter, 5' deep drywells.

MassDOT has communicated that they will not allow infiltration chambers under state-owned roadways. Therefore, the new drainage system will need to send previously infiltrated water to various outfalls as discussed below.

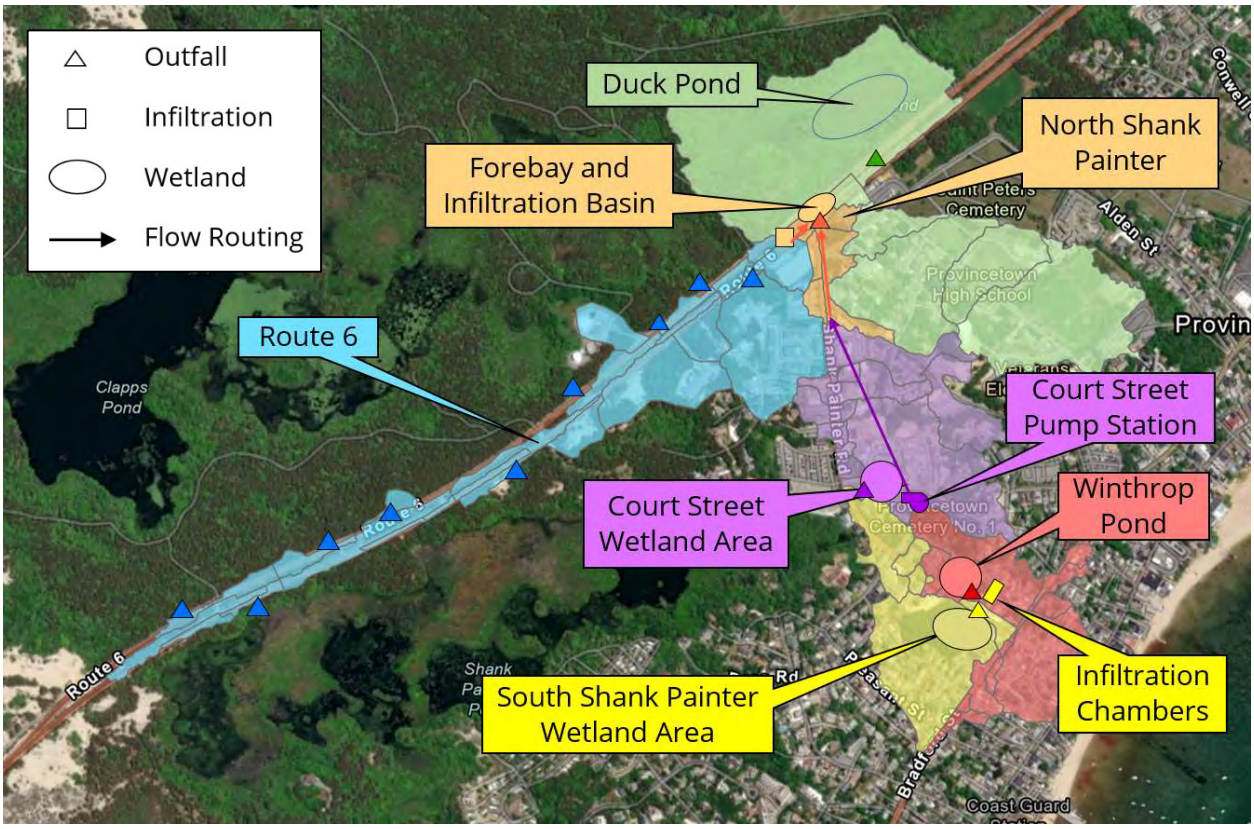


Figure 3 - Proposed Drainage Features

Zone 3: North Shank Painter Drainage

The North Shank Painter Drainage area includes the area at the intersection of Route 6 and Shank Painter, and the north end of Shank Painter, up to the high point near station 17+00. There are two catch basins in the intersection that bring runoff from this area to the existing outfall for Duck Pond. In other words, in existing conditions, the flow from this area contributes to Zone 2. In proposed conditions, runoff from this area will be sent to a new outfall at the north side of the intersection, discharging to Duck Pond. The new outfall includes a forebay and infiltration basin, with a rip rap weir overflow. The impervious area increases by about 5,210 SF.

Zone 4: Court Street Drainage

The Court Street Drainage area includes all Subcatchments that lead to the Court Street Wetland Area and the low point on Court Street. There are two existing catch batch inlets that outfall to the

wetland area, one on Shank Painter Road and one on Court Street. The new design will include removing the existing outfalls and installing a new outfall for flow collected on Shank Painter Road. An overflow structure at the edge of the wetland area will convey storm flow to the new pump station.

The new pump station on Court Street will intake water from the wetland area overflow structure and the new collection system on Court Street. This will be pumped to a stilling basin near the high point of Shank Painter Road, and then continue through the North Shank Painter drainage system before entering the new forebay and infiltration basin on Route 6 in the North Shank Painter Catchment Area. For more information on the pump station design, see the Alternatives Analysis section below.

The net change to impervious area in this catchment area is due to changes on Shank Painter Road. There is an increase of approximately 3,690 SF.

Zone 5: South Shank Painter Wetland

The South Shank Painter Wetland is located near the southwest corner of the intersection of Bradford Street and Shank Painter Road, between Shank Painter Road and Conant Street. Currently, there are no existing outfalls that flow to this area; it accepts only overland flow.

A new subsurface infiltration chamber will be installed under the parking lot between 9 and 13 Shank Painter Road. A new outfall will be added to the wetland area to outlet flow collected from the new South Shank Painter collection system and the overflow line from the proposed subsurface infiltration chambers. For more information on the design, refer to the alternatives section. The impervious area increased by approximately 12,070 SF.

Zone 6: Winthrop Pond

The Winthrop Pond is located between Winthrop Street and Shank Painter Road next to the Provincetown Fire Department building at 25 Shank Painter Road. Its contributing area includes all Subcatchments that are conveyed through a piped drainage system along Bradford Street, which eventually outfalls to the Winthrop Street Wetland Area on its east side, and a smaller piped drainage system on Shank Painter Road that outfalls to the wetland area on its west side. Its contributing area also includes all Subcatchments that sheet flow into the wetland area from Winthrop Street and just north of Winthrop Street.

The wetland area is currently over capacity. Winthrop Street regularly experiences flooding issues due to low elevations along the street and the wetland overflowing.

The outfall from the smaller piped drainage system on Shank Painter Road will be removed for the proposed design, and will instead be conveyed to the South Shank Painter wetland area. Due to the addition of new sidewalks, there will be an increase of around 4,700 square feet of impervious area.

Impaired Waters

Apex reviewed the 2022 and 2018/2020 MassDEP “Integrated List of Waters” for impaired water bodies in Provincetown. There are three water bodies listed in these reports. Only one water body,

Clapps Pond (MA96035) is near the project area and will receive drainage flow from existing outfalls on Route 6. Clapps Pond has not been assessed and does not have a TMDL.

Hydrologic and Hydraulic Drainage Model

The H&H model setup, data sources, assumptions, and components are described in Attachment 2.1, "Design Parameters". Attachments 2.2 through 2.4 show the background data for soil type, rainfall totals, and existing land use types. The subcatchments and time of concentration lines are shown in attachments 3.1 and 3.2, respectively. A map of the existing and proposed model features are shown in attachments 3.3 and 3.4, respectively.

Alternatives Analysis and Design

The drainage design for Shank Painter Road involved adding catch basins along the full length of the road to catch the runoff that would be trapped by the new sidewalk curbing. We completed an alternatives analysis for the drainage design of the areas with the existing flooding issues: Court Street and South Shank Painter.

Court Street Preliminary Alternatives Analysis

Court Street is the lowest elevation in its immediate surroundings. Traditional gravity conveyance of stormwater on Court Street is not an option due to the local topography. The nearest wetland area, the Court Street Wetland, is over capacity during rain events and cannot be used for storage for solving the flooding issues. Apex assessed the following three options at a high level for flood mitigation:

- Infiltration – This is not feasible in this location. The groundwater level is as little as 3' below grade, so there is no room for infiltration features.
- Storage – During a 10-year storm event, approximately 0.98 MG of water collects on Court Street, equivalent to 1.2 Olympic swimming pools. There is not enough space in Town owned land on Court Street to store this large of a volume
- Pumping – This is the only feasible way to move flood water out of Court Street. Pumping with wet well storage can be used to balance between available on site storage space and size of the pumps.

Court Street Pumping Discharge Alternatives Analysis

Apex evaluated three wetland locations for pumped discharge, and assessed the pros and cons of each location. This is described in detail in Attachment 1.1, and summarized below.

Jerome Smith Road Wetland Area

- Pros:
  - Not in the 100-year Flood Zone Area
  - No disturbance to abutters
- Cons:
  - Small storage capacity (0.57 MG)
  - Wetland abuts Wastewater Effluent Leaching Fields
  - More expensive due to additional onsite storage needed on Court Street

Shank Painter Pond

- Pros:
- Cons:

- Shortest Pumped Distance
- Approximately 1.9 MG of storage available
- 100-yr Flood Zone
- Impact to abutting properties
- Great Pond – Chapter 91 Permit
- Private Property

Duck Pond

- Pros:
  - Duck Pond is not a 100yr FEMA Flood Zone
  - No disturbance to abutters
  - More than enough storage for 10-year storm (4.7 MG)
  - Forebay and Basin lowers peak velocity to below 3 fps
- Cons:
  - Short term flooding on Court Street (true for all alternatives)

Duck Pond was the best option for discharging pumped stormwater.

Court Street Pump Station Design

The stormwater infrastructure around the Court Street Wetland and for the Court Street Pump Station consists of the following elements, also shown in Figure 4.

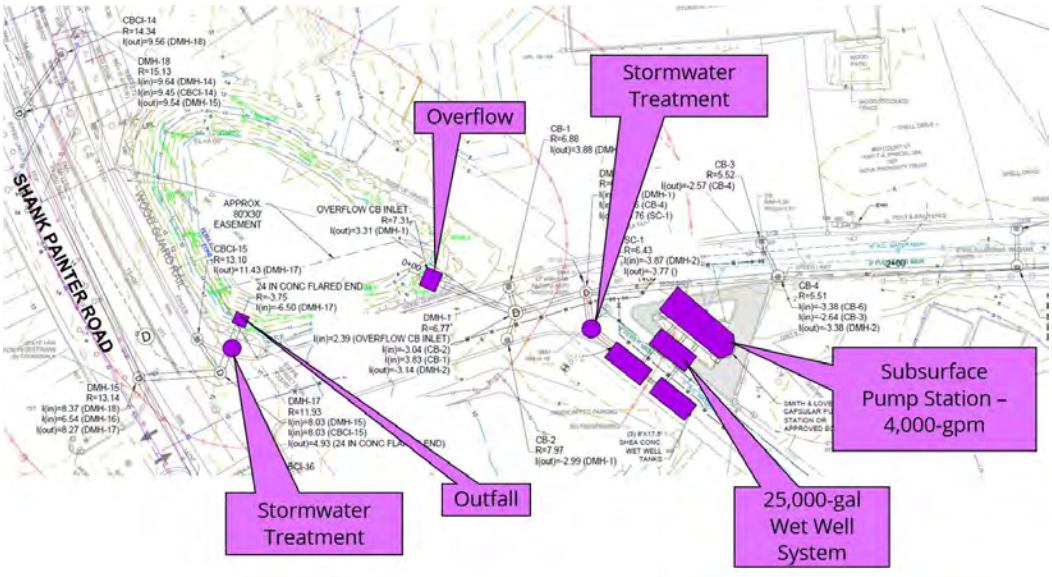


Figure 4 - Court Street Pump Station Infrastructure

- Shank Painter Road drainage to outfall to Court Street Wetland
  - Deep sump catch basins will treat stormwater before it discharges into the Court Street Wetland area.
  - The outfall includes a new precast concrete headwall with a rip rap pad base. The rip rap pad is being used to dissipate the energy from the stormwater flow. Without the rip rap pad, scouring would occur in the wetland area.
- Overflow Structure

    - A precast concrete overflow structure with a raised beehive style grate will be placed at the edge of the wetland area. This will receive storm flows that would have normally overflowed from the wetland area. The overflow elevation is set so that it is higher than normal water levels in the wetland area, and lower than the natural overflow elevation of the wetland area.
- Court Street Drainage System
    - A new drainage system with deep sump catch basins will be installed along Court Street.
    - Court Street drainage will flow through a hydrodynamic separator before entering the wet wells and pump station.
- Wet wells
    - On site storage will include three separate precast tanks that have a combined storage capacity of 25,000 gallons.
- Pump Station
    - The subsurface station will have two pumps for lead and lag pumping. Each pump has a peak flow rate of 2,000 gpm, for a combined flow rate of 4,000 gpm. There is space reserved for a third pump for redundancy.

The Pump Station discharges flow through a force main that eventually sends flow to Duck Pond. This part of the drainage infrastructure includes the following components

- Force Main
    - The force main directs flow north along Shank Painter Road.
    - The force main discharges to a stilling basin near the top of Shank Painter Road.
    - Flow combines with the new drainage system in the North Shank Painter area.
- Forebay and Infiltration Basin
    - The combined flow from the Court Street Pump Station and the North Shank Painter drainage system enter a 1,300 gallon forebay.
    - A rip rap weir leads from the forebay to a 9,000 gallon infiltration basin.
    - One more rip rap weir conveys the treated stormwater overflow to the Duck Pond wetland area.

Model Results

The Court Street Pump Station and contributing drainage systems on Shank Painter Road and Court Street were designed around the 10-year storm event. Table 1 below shows the flood and pond water elevations on Court Street and in Duck Pond.

Table 1 - Court Street and Duck Pond Flood Elevations

Storm	Court Street Flooding Elevation (Road low point Elev. = 5.0')		Duck Pond Water Elevation (Typ. Water Elev. Approx.= 4.0')	
	Existing	Proposed	Existing	Proposed
2-yr 24-hr	5.8	No flooding	4.3'	5.3'
10-yr 24-hr	6.0'	5.9'	4.6'	5.4'
100-yr 24-hr	6.4'	6.3'	5.0'	5.5'

The water levels in Duck Pond increase for each modeled storm event. The additional water is contained within the wetlands around Duck Pond without any encroachment on the roadway. A float valve will be installed on the edge of the wetlands for Duck Pond to monitor the water levels. If the water levels rise to an elevation of 6.0', the Provincetown DPW will be notified. The DPW can then determine if the pump station should be turned off or left on, based on flooding conditions at Court Street and Route 6 near Duck Pond.

The drainage improvements eliminate flooding on Court Street in the 2-yr storm event. The peak water depths are lowered for the 10-year and 100-year storm events by a marginal amount. Flooding could not be fully eliminated on Court Street without significantly increasing either the underground storage in the wet wells or the size of the pumps. However, the duration of flooding cut down to a fraction of existing Conditions. Refer to Figure 5 for the peak flooding extent, and Figure 6 for the flooding extent one-hour after the peak.

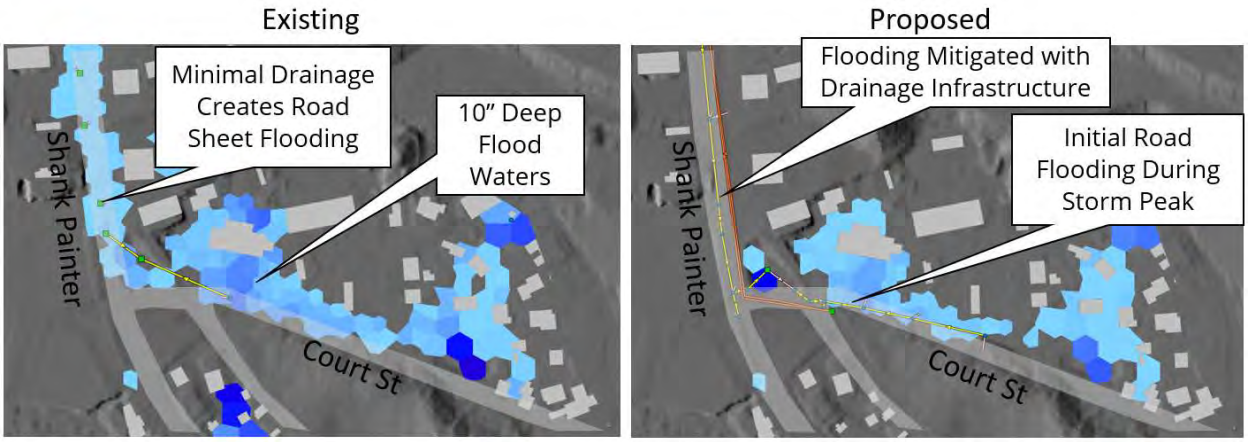


Figure 5 - Court Street 10 Year Peak Flood Extent

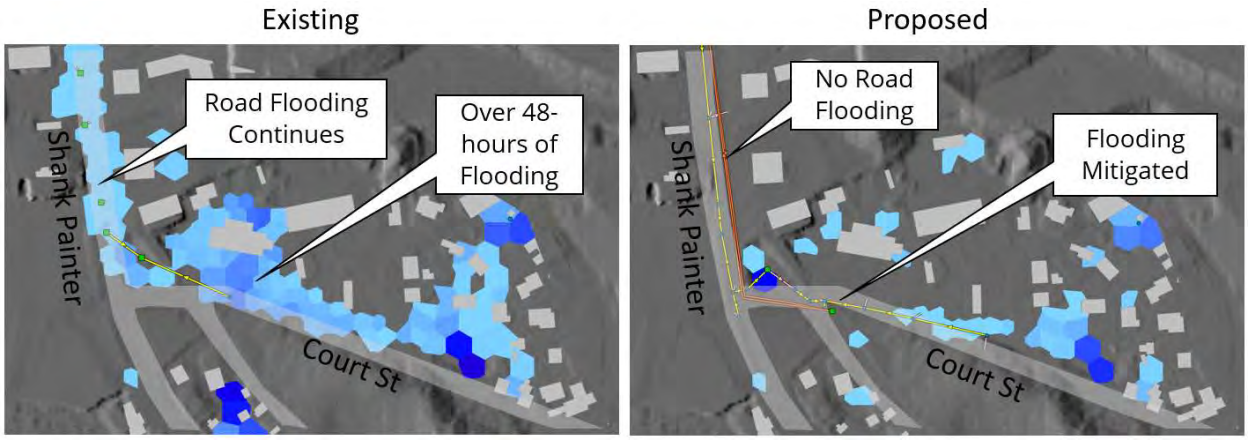


Figure 6 – Court Street 10 Year Flood Extent 1 hour Post Peak

At the peak flood depth for the 10-year storm, the proposed drainage system eliminates any nuisance flooding on Shank Painter Road. There is marginal improvements to the extent of flooding on Court Street.

One hour later, existing conditions show no improvement to flood levels as there is nowhere for the water to go. With the pump station, flooding is nearly eliminated within just one hour, and is reduced to puddles in most areas.

South Shank Painter Alternatives Analysis

As described in the Zone 5 and Zone 6 descriptions above, Winthrop Pond has two existing outfalls: one conveying flow from a portion of south Shank Painter Road, and the second conveying flow from Bradford Street. This pond frequently overflows, flooding abutting properties, including an apartment complex on Winthrop Street.

The proposed roadway improvements includes raised sidewalks that would trap flow runoff in the roadway. Additional catch basins will be added, expanding the extent of drainage infrastructure in the South Shank Painter area. If the existing outfall to Winthrop Pond were reused for this additional flow, the Winthrop Pond would suffer even more frequent flooding than it currently does.

Infiltration Chamber Design

Geotechnical Borings were completed on September 7, 2023 by Northern Drilling Services Inc. on Shank Painter Road. Two borings were completed on two parking lots that could be used for subsurface infiltration systems: the parking lot between the Fire Station and Winthrop Pond, and the gravel parking lot near 15 Shank Painter Road. Both showed groundwater 5-6 below grade. The Fire Station parking lot was removed from consideration for infiltration systems as it is at the lowest point of the roadway, and will be the first to be inundated with flooding between the two areas.

We looked at different proprietary infiltration systems. The infiltration system had to fit between a minimum elevation of 2’ above the groundwater table, while also having enough cover over the structures for surface restoration. We ended up selecting Cultex 150 CLHD model as a basis of design. Ten rows of seven chambers per row would fit within the parking lot area. The chambers and crushed stone combined storage volume is 3730 CF.

Site restrictions, such as roadway utilities and limited space available for large infiltration structures, limited the ability to install more infiltration structures beyond this system. The infiltration chambers would receive surface runoff from the parking lot and the southern-most end of South Shank Painter Road.

Outfall Alternatives

The infiltration system cannot provide enough capacity for the full South Shank Painter drainage area. The northern part of the South Shank Painter system and the overflow from the infiltration basins would need to be sent to an outfall. We assessed the following wetlands for the new outfall, summarized in Table 2.

Table 2 - South Shank Painter Outfall Alternatives

Wetland Area	Assessment
Winthrop Pond	Overcapacity in existing conditions
Shank Painter Pond	Unreachable with gravity drainage
Court Street Pump Station	Unreachable with gravity drainage
South Shank Painter Wetland Area	Accessible

The existing Winthrop Pond is already over capacity in existing conditions. The closest large wetland body is Shank Painter Pond. A gravity drainage system would not be able to convey flow there due to elevation constraints. Similarly, a gravity drainage system would not be able to convey flow to the new Court Street Pump Station. An isolated wetland area labeled South Shank Painter Wetland area is across the street from the proposed infiltration chamber system. This wetland is accessible by gravity flow and has capacity to receive additional drainage flow.

Table ***3*** below shows key elevations in the South Shank Painter wetland area.

Table 3 - South Shank Painter Flood Elevations

Elevation	Existing	Proposed
House Elevation (LiDAR)	Between 6.0′ and 7.8′	
Wetland Elevation (LiDAR)	2.7′	
2-yr 24-hr Modeled Flood Elev.	4.0′	4.6′
10-yr 24-hr Modeled Flood Elev.	5.0′	5.9′
100-yr 24-hr Modeled Flood Elev.	6.5′	6.4′
FEMA 100yr Flood Zone Elev.	9.0′	

The closest building to the wetland area is the house for 48-B Bradford Street. The lowest house corner elevation is somewhere between 6.0′ and 7.8′, as measured by GIS data only. The lowest elevation in the wetland according to LiDAR data is 2.7′. The modeled flood depth in the wetland area increases by 0.6′ and 0.9′ for the 2-year and 10-year storms respectively. The flood depth stays about the same for the 100-year storm event.

The FEMA 100-yr flood zone for Shank Painter Pond extends into this area. The flood zone elevation is 9.0′. The model does not include Shank Painter Pond and its contributing flow, and therefore does not show the influence of the flood zone on this area. The flooding from Shank Painter Pond would overshadow any of the drainage modifications made in this area.

System Overview

The existing and proposed drainage systems in the South Shank Painter area are shown in Figure 7 below.



Figure 7 - South Shank Painter Drainage: Existing (Left) and Proposed (Right)

A hydrodynamic separator would be installed to treat the South Shank Painter drainage system flow before it discharges to the outfall. A second hydrodynamic separator would be installed to treat stormwater flow before it enters the infiltration chambers. Overflow from the infiltration chambers will flow to the new outfall. The new outfall will have a rip rap pad to dissipate energy.

No changes will be made to the existing Bradford Street drainage system that discharges to the Winthrop Pond wetland area.

LID Alternatives Analysis

The following LID measures were considered. but not included in the final design:

- No disturbance to any Wetland Resource Areas
    - The existing drainage system is inadequate to handle the stormwater flows for Shank Painter Road and Court Street. In order to improve the existing drainage system, limited wetland disturbance is needed for two drainage outfalls and one drainage overflow. Refer to the NOI Narrative for additional information on the work occurring within the wetland resource areas and how the disturbance was minimized to the maximum extent practicable.
- Reduced Impervious Area
    - The need for safe pedestrian and bicycle infrastructure necessitated limited expansions of the existing paving area for sidewalks and bike paths. The footprint for impervious area was limited to the maximum extent practicable.
- Minimizing disturbance to existing trees and shrubs
    - Tree disturbance was **limited to the maximum extent practicable**. The overall design had to balance between the roadway, sidewalk and bike lane layout, utility layout, and meeting ADA compliance clearance on sidewalks. Trees were preserved whenever it was possible to do so while also meeting the additional design requirements. New tree plantings are proposed along the length of Shank Painter Road.
- Water Quality Swale, Grass Channel, or Use of “country drainage” versus curb and gutter conveyance and pipe
    - Country drainage could not be used in this heavily developed roadway project. Space is limited in this project due to working around existing built infrastructure, providing

space for safe pedestrian and bicycle paths, and working within Town owned right of way footprints.

Checklist for Stormwater Report

The MassDEP Checklist for Stormwater Report has been included in Appendix F of the Notice of Intent application, preceding this report. The Checklist has been stamped and signed by a Registered Professional Engineer in the State of Massachusetts.

Based on our review of 310 CMR 10.00 and the MassDEP Stormwater Standards, we have determined that this project is a Redevelopment Project. According to 310 CMR 10.04, and guidelines of Volume 2, Chapter 3 of the MassDEP Stormwater Handbook: Checklist for Redevelopment Project:

> *"Redevelopment is defined to include*
>
> - *Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving;*
> - *Development rehabilitation, expansion and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area; and*
> - *Remedial projects specifically designed to provide improved stormwater management, such as projects to separate storm drains and sanitary sewers, and stormwater retrofit projects.*
>
> *Components of redevelopment projects that include development of previously undeveloped sites do not meet this definition. The portion of the project located in a previously developed area must meet Standard 7, but project components within undeveloped areas must meet all the Standards."*

This project is a redevelopment project. It includes work within existing developed areas, improving roadways, sidewalks, bike infrastructure, intersections, and existing drainage systems.

As a redevelopment project, existing site restraints are recognized by MassDEP as limitations to being able to fully comply with the standards. The MassDEP Stormwater Handbook Checklist for Redevelopment states the following about site constraints:

> *"MassDEP recognizes that site constraints often make it difficult to comply with all the Standards at a redevelopment site. These constraints are as follows:*
>
> - *Lack of space. Because of the presence of existing structures, on-site subsurface sewage disposal systems, stormwater best management practices, and water bodies and wetlands, and easements, the space available for the installation of additional stormwater BMPs may be quite limited. On many sites it may be difficult or impossible to use space-intensive BMPs such as wet detention basins.*
> - *Soils: The presence of bedrock or clay can limit the effectiveness of infiltration or detention BMPs. Often soils at redevelopment sites have been compacted by buildings and heavy traffic, impairing their ability to infiltrate stormwater into the ground.*

- *Underground utilities. The presence of underground utilities including gas and water mains, sewer pipes and electric cable conduits can greatly reduce the amount of land available for BMPs."*

Space is a limiting factor on this site. Work is restricted to MassDOT and Town owned land. As discussed in the alternatives section, existing groundwater levels limit the capacity of onsite infiltration. Underground utilities and abutting properties limit the space for most best management practices.

Being a redevelopment project, the stormwater design must meet the design standards to the maximum extent practicable. The MassDEP Stormwater Handbook Checklist for Redevelopment defines this as follows:

> *"As set forth in Standard 7, the phrase "to the maximum extent practicable" means that:*
>
> 1. *Proponents of redevelopment projects have made all **reasonable efforts** to meet the requirements of Standards 2 and 3 and the pretreatment and structural stormwater best management practices requirements of Standards 4, 5, and 6 and to bring existing outfalls into compliance with Standard 1.*
> 2. *They have made a complete evaluation of possible stormwater management measures, including environmentally sensitive site design that minimizes land disturbance and impervious surfaces, low impact development techniques and structural stormwater BMPs; and*
> 3. *If not in full compliance with Standard 1 for existing outfalls, Standards 2 and 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6, they are implementing **the highest practicable level of stormwater management**."*

Stormwater Standard 1: No Untreated Discharges or Erosion to Wetlands

No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Redevelopment requirements per Massachusetts Stormwater Handbook Volume 2 Chapter 3:

- *Full compliance with Standard 1 is required for new outfalls.*
- *Existing outfalls shall be brought into compliance with Standard 1 to the maximum extent practicable.*

In assessing the stormwater standards, we divided our analysis based on the following analysis points described in Table 4.

Table 4 - Analysis Point Summary

Zone	Analysis Point Name	Existing Conditions	Proposed Changes
1	OF-RS-6-N	Existing Outfall outletting north of Rt6	Minor - CB Replacements/Adjustments
	OF-RS-7-S	Existing Outfall outletting south of Rt6	Minor - CB Replacements/Adjustments
	OF-RS-8-N	Existing Outfall outletting north of Rt6	Minor - CB Replacements/Adjustments
	OF-RS-9-N	Existing Outfall outletting north of Rt6	Minor - CB Replacements/Adjustments
	OF-RS-10-S	Existing Outfall outletting south of Rt6	Minor - CB Replacements/Adjustments
	OF-RS-11-N	Existing Outfall outletting north of Rt6	Minor - CB Replacements/Adjustments
	OF-RS-12-N	Existing Outfall outletting north of Rt6	Minor - CB Replacements/Adjustments
	OF-RS-13-S	Existing Outfall outletting south of Rt6	Minor - CB Replacements/Adjustments
2	OF-SP-1-WJ	Existing/Reusing Outfall outletting north of Rt6	Minor - CB Replacements/Adjustments
3	Rt 6 Basin OF	Existing Runoff Goes to Zone 2 Outfall	New Outfall from Infiltration Basin
4	Court Street Wetland Area	Existing pond with two outfalls	Removing two outfalls, adding a new one
5	Shank Painter South Pond OF	Existing Runoff Sheet Flows to Wetland Area	New Outfall
6	Winthrop Pond	Existing pond with two outfalls	Removing one outfall

No New Untreated Discharges

As noted in Table 4, there are three new outfalls that will be included in this project:

- Zone 3: the new outfall is a rip rap weir for overflow from the new forebay and infiltration basin.
- Zone 4: One new outfall with a 24" RCP drain pipe discharges flow from the new drainage system on Shank Painter Road between STA 18 and STA 26
- Zone 5: One new outfall with an 18" RCP drain pipe discharges flow from the new drainage system on the south end of Shank Painter Road between STA 27 and STA 37.

Refer to Standard 4 for an overview of the water quality treatment that is provided in Zones 3, 4, and 5. Each area includes stormwater treatment to remove total suspended solids (TSS) to the maximum extent practicable before discharging to the new outfall. Therefore, the proposed work meets the requirement of "no new **untreated** discharges".

Erosion to Wetlands from Discharges

Refer to Attachment 4.1 for a detailed overview of the velocities entering the different analysis points.

For the new outfalls, refer to the summary in Table 5 below.

Table 5 - New Outfall Velocities

Analysis Point	2yr-24hr Velocity (fps)	10yr-24hr Velocity (fps)
Zone 3 – Rt 6 Basin OF	2.0	2.8
Zone 4 – Court St Wetland Outfall	6.7	7.6
Zone 4 – Court St Wetland, Riprap Pad	2.8	3.3

Zone 5 – South Shank Painter Wetland Outfall	7.5	7.0
Zone 5 – South Shank Painter Wetland Riprap Pad	2.7	3.1

In Zone 3, the forebay and infiltration basin lead to the new rip rap weir overflow outfall to the Duck Pond wetland area. The modeled velocities leaving the infiltration basin over the weir are all less than 3 fps.

In Zone 4 and Zone 5, the modeled velocities leaving the 24" and 18" RCP outfalls, respectively, are between 6 and 8 fps. Both outfalls will have rip rap pads to dissipate the energy of the storm water flow. With the rip rap pads in place, the velocities are reduced to a safe level of less than 4 fps entering the wetland areas.

For the existing outfalls, most of the velocities are slightly reduced. Three of the outfalls on Route 6 have slightly higher velocities in proposed conditions than existing conditions, due to the increase in impervious area: OF-RS-6-N, OF-RS-7-S, and OF-RS-11-N. The increase velocities are less than 5% greater than existing conditions. Our work on Route 6 will not involve disturbing any wetlands or rehabilitation at the outfalls, so we believe we are meeting Stormwater Standard 1 for existing outfalls to the maximum extent practicable.

Stormwater Standard 2: Peak Rate Attenuation

Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for land subject to coastal storm flowage.

Redevelopment requirements per Massachusetts Stormwater Handbook Volume 2 Chapter 3:

- *Compliance to the Maximum Extent Practicable. If this standard is not met, the applicant shall document an analysis of alternative approaches for meeting the Standard.*

Refer to the alternatives analysis section above for a review of the alternatives considered for the Court Street Pump Station and the drainage work on the South Shank Painter area. Refer to Attachment 4.2 for a detailed list of the peak flow rates for each analysis point.

Zones 1, 2 and 6 – Route 6, Duck Pond and Winthrop Pond

No major changes are made to the drainage systems in zones 1 and 2. There are a few instances of increased peak flows in Zone 1 due to increases in impervious area (see Standard 1 above).

The peak rates for the existing Zone 2 OF-SP-1-WJ outfall to Duck Pond has a decrease in flow in proposed conditions compared to existing conditions. This is due to the contributing flow from Zone 3, the intersection in the North Shank Painter drainage area, being redirected from Zone 2 to the new outfall in Zone 3.

The existing outfall from South Shank Painter Road to Winthrop Pond is removed in proposed conditions. The existing outfall conveying drainage from Bradford Street to Winthrop Pond is not modified. The combined peak flow to the Winthrop Pond decreases in proposed conditions due to the redirection of flow to the new outfall in Zone 5.

Zone 3 – North Shank Painter

The new outfall in Zone 3 receives flow from the North Shank Painter drainage area and from the force main discharge from the Court Street Pump Station. This flow is an increase compared to existing conditions in this area. As described in the alternatives analysis section, sending the force main discharge to Duck Pond was the most favorable alternative for alleviating the flooding issues on Court Street. The forebay and infiltration basin were designed to use as much space on the edge of the road as was feasible to include to reduce the peak flow discharge into the Duck Pond wetland area.

Zone 4 – Court Street

The new outfall to the Court Street Wetland Area is a 24" RCP drain pipe that replaces the two separate existing outfalls to this wetland area. The improved drainage capture on Shank Painter Road results in an increase of peak flow to this wetland area. Due to MassDOT requirements, we were not able to install any on site infiltration BMPs in the Shank Painter Road layout. The drainage system conveys the 10-year storm event.

Zone 5 – South Shank Painter

The new outfall in Zone 5, South Shank Painter, is the discharge for the new drainage system in the South Shank Painter area, as well as the overflow for the infiltration system in the parking area. No additional on-site BMPs could be installed in the roadway due to MassDOT requirements. Refer to the alternatives analysis section for additional considerations around this new outfall.

This drainage design improves the existing flooding issues on Shank Painter Road and Court Street. Through a comprehensive alternatives analysis, the best solution was chosen considering site restrictions such as ground water and utility barriers, minimizing cost and avoiding impacting abutters, and alleviating flooding in public right of ways.

Stormwater Standard 3: Stormwater Recharge

Loss of annual recharge to ground water shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusettss Stormwater Handbook.

Redevelopment requirements per Massachusetts Stormwater Handbook Volume 2 Chapter 3:

- *Compliance to the Maximum Extent Practicable. If this standard is not met, the applicant shall document an analysis of alternative approaches for meeting the Standard.*

Infiltration Infrastructure

Refer to the alternatives analysis section for a summary of the site restrictions and alternatives considered on Court Street and South Shank Painter. Refer to Attachment 4.3 for calculations on the required recharge volumes for each Zone. Refer to Attachment 4.4 for a summary of the existing and proposed infiltration volumes, versus the required recharge volumes.

There will be an increase in impervious area in Route 6 and throughout Shank Painter Road to accommodate the proposed street scape improvements, including sidewalks and biking infrastructure. This results in the need for additional infiltration. MassDOT will not allow any infiltration structures to be built within the roadways, which significantly reduces opportunities for installing infiltration infrastructure. There are no proposed modifications made to the drainage systems in Zone 1, 2, or 6. The existing infiltration structures on Shank Painter Road in Zone 3 will be removed in proposed conditions.

The proposed infiltration structures include the following:

- Four new 6-foot diameter drywells on the north end of the intersection of Route 6 and Shank Painter Road.
- A new forebay and infiltration basin on the north end of the intersection of Route 6 and Shank Painter Road.
- An infiltration chamber system on the south end of Shank Painter Road under a parking lot near 15 South Shank Painter Road.

The combined total infiltration volumes provides over four times the total infiltration storage volume capacity as compared to existing conditions.

Stormwater Standard 4: Water Quality

Stormwater management systems must be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:

a. *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan and thereafter are implemented and maintained;*
b. *Stormwater BMPs are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
c. *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

Redevelopment requirements per Massachusetts Stormwater Handbook Volume 2 Chapter 3:

- *Full compliance with the long-term pollution plan requirement*
- *Compliance to the Maximum Extent Practicable. If this standard is not met, the applicant shall document an analysis of alternative approaches for meeting the Standard.*

Refer to Stormwater Standard 9: Operation and Maintenance Plan for the maintenance of the new BMP infrastructure. Roadway maintenance shall be according to typical Town standards, which includes street sweeping and catch basin cleaning.

Refer to Attachment 4.5 for calculations on the required treatment volumes due to impervious areas. As this is a redevelopment project in an existing urban area, the treatment volumes include the entire contributing area for each study area. These large volumes cannot be feasibly treated. However, we believe we are meeting Standard 4 to the maximum extent practicable by providing total suspended solids (TSS) treatment for all new outfalls.

Refer to Attachment 4.6 for the TSS removal calculations for each study area. No modifications are being made to the drainage systems in Zones 1, 2, and 6. Refer to

Table 6 below for a summary of the TSS% removal in each of the new drainage systems.

Table 6 - TSS % Removal Summary

Locationp	Total TSS Removal
Zone 3 – North Shank Painter Drywells	98%
Zone 3 – North Shank Painter Infiltration Basin	89%
Zone 4 – Court St Outfall	29%
Zone 4 – Court St Pump Station (HDS-301) and Zone 5 South Shank Painter (HDS-401)	86%
Zone 5 – South Shank Painter Infiltration Chambers (HDS-402)	97%

The infiltration basin in the North Shank Painter area and the infiltration chambers in the South Shank Painter area have more than 44% TSS removal prior to entering the infiltration structures.

Hydrodynamic Separators

There are three hydrodynamic separators included as part of the project – HDS-301 before the Court Street Pump Station, HDS-401 before the South Shank Painter outfall, and HDS-402 to the South Shank Painter Infiltration Chambers. The notice of intent submitted to MassDOT for review in October 2024 and submitted to the Provincetown Conservation Commission and MassDEP in January 2025 included a fourth hydrodynamic separator at the Court Street outfall. Apex had selected hydrodynamic separators for treatment due to the limited space available for stormwater control measures. All other stormwater control measure options would require more space than there is available on the project site.

MassDOT's standard practice for drainage design is to not use hydrodynamic separators. Their Stormwater Design Guide states the following:

> *"Designers should note that due to their inaccessibility for inspection, need for extended lane closures, difficulty/expense of clean-out, and limited treatment performance, MassDOT does not deem hydrodynamic separators to be practicable for use on MassDOT properties or along roadways in general. Accordingly, MassDOT will not fund these devices for use on municipal projects executed by MassDOT."*

This project is funded by MassDOT. Due to MassDOT's policy of not funding hydrodynamic separators, Provincetown has elected to pay for the hydrodynamic separators themselves. Provincetown has limited capital funds to spare, and could not afford to pay for all four units. Apex considered the following when evaluated which, if any, hydrodynamic separator(s) could be removed from the project while still providing a sound design for maintenance and environmental protection:

- Pretreatment Requirements
    - The South Shank Painter subsurface infiltration system requires 44% TSS removal from stormwater prior to entering the structure. Therefore, the hydrodynamic separator is essential to the design in this area.
    - The Court Street Pump Station needs TSS pretreatment prior to having stormwater go through the pumps. If the hydrodynamic separator was removed from this area,

the wear and tear of the TSS on the pumps would significantly reduce the lifetime of the pumps, resulting in more frequent maintenance and pump replacement. Therefor, the hydrodynamic separator is essential to the design in this area.

- Wetland Resource Area Protection
    - The South Shank Painter wetland resource area was identified as Bordering Vegetated Wetland. The wetland area is approximately 38,200 SF, or 0.88 acres. This wetland does not have existing drainage outfalls.
    - The Court Street wetland resource area was identified as Isolated Vegetated Wetland. The wetland area is approximately 6,500 SF, or 0.15 acres. This wetland has two existing drainage outfalls and abuts an industrial property.
    - The South Shank Painter wetland resource area is a higher value wetland than the Court Street wetland resource area. Therefore, Apex advised the Town to keep the hydrodynamic separator for the South Shank Painter outfall.

Isolated vegetated wetlands, like the wetland at the corner of Court Street, are protected under the Provincetown Wetland Bylaws, and are not protected by the MassDEP Wetlands Protection Act. The Provincetown bylaws state that practicable alternatives shall take into consideration the costs of the alternatives and the overall project costs (Section 12-7-4). Due to the limited space available for stormwater control measures, the use of deep sump catch basins for TSS treatment, the project budget constraints, and the wetland resource area protection considerations stated above, we believe the Court Street wetland area is protected to the maximum extent practicable.

Stormwater Standard 5: Land Uses with Higher Potential Pollutant Loads

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific stormwater BMPs determined by the Department to be suitable for such use as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Redevelopment requirements per Massachusetts Stormwater Handbook Volume 2 Chapter 3:

- *Full compliance with the pollution prevention requirements*

There are no proposed new Land Uses with Higher Potential Pollutant Loads (LUHPPL) within the project area. There are four existing LUHPPL sites that abut the project area, as shown in Attachment 4.7. Each site is responsible for maintaining their own pollution prevention plan.

The Town of Provincetown maintains their roadways through regular street sweeping and catch basin cleaning. Refer to Stormwater Standard 9 for additional operation and maintenance of the

new BMP structures. All new catch basins will include hoods for oil separation. In addition, there are three new hydrodynamic separators proposed for TSS removal and oil separation.

Stormwater Standard 6: Critical Areas

Stormwater discharges to a Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or any other critical area require the use of the specific source control and pollution prevention measures and the specific stormwater best management practices determined by the Department to be suitable for managing discharges to such area, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters or Special Resource Waters shall be set back from the receiving water and receive the highest and best practical method of treatment. A "stormwater discharge," as defined in 314 CMR 3.04(2)(a)1. or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.

Redevelopment requirements per Massachusetts Stormwater Handbook Volume 2 Chapter 3:

- *Full compliance with the pollution prevention requirements*
- *Compliance to the Maximum Extent Practicable with pretreatment and treatment requirements of Standard 6*

Refer to Attachment 4.8 for figures showing critical areas near the project site. Refer to Table 7 for a summary of the critical areas.

Table 7 - Critical Area Summary

Resource Area	In Project Area?
Outstanding Resource Water	No
Shellfish Growing Areas	No
Bathing Beaches	No
Cold Water Fisheries	No
Zone II or Interim Wellhead Protection Area	No
Zone I or Zone A	No

The closest resource area to the project site is the Cape Cod National Seashore, an Outstanding Resource Water. The shortest distance from the new outfall to Duck Pond is approximately 500' from the border of the Outstanding Resource Water as shown on MassGIS data layers. While we do not anticipate any impact to the Outstanding Resource Water from the new outfall, we have provided treatment to the maximum extent practicable. Refer to Stormwater Standard 4 for an overview of the treatment offered at this project area. In summary, a combination of deep sump catch basins, a hydrodynamic separator before the Court Street Pump Station, infiltration forebay and infiltration basin with a rip rap weir exceed the treatment requirements.

Stormwater Standard 7: Redevelopment

This project is a redevelopment project. It includes work within existing developed areas, improving roadways, sidewalks, bike infrastructure, intersections, and existing drainage systems.

As a redevelopment project, existing site restraints are recognized by MassDEP as limitations to being able to fully comply with the standards. Space is a limiting factor on this site. Work is restricted to MassDOT and Town owned land. As discussed in the alternatives section, existing groundwater levels limit the capacity of onsite infiltration. Underground utilities and abutting properties limit the space for most best management practices.

Being a redevelopment project, the stormwater design must meet the design standards to the maximum extent practicable.

Refer to the summary at the beginning of the Checklist for Stormwater Report section for additional information on why this project counts as a redevelopment project.

Stormwater Standard 8: Construction Period Controls

A plan to control construction-related impacts, including erosion sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan), must be developed and implemented.

Construction period pollution prevention and erosion and sedimentation control measures will be implemented at the project site to control construction related impacts during construction and land disturbance activities. The General Contractor for the project will be responsible for implementation of the construction period controls before any land disturbance.

The project will disturb more than one acre of land and will require a NPDES Construction General Permit issued by the Environmental Protection Agency. As a result, the General Contractor will be required to prepare a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP document will satisfy the requirements of the Construction General Permit and the construction period erosion, sedimentation and pollution prevention plan requirements outlined in Standard 8 of the Massachusetts Stormwater Handbook. A SWPPP has not been prepared for inclusion with this stormwater report; however, one will be prepared prior to any construction activities at the site by the General Contractor."

The following Best Management Practices (BMPs) are located on the Plans in Appendix D.

- **Sedimentation control devices** (e.g. filter sock and silt fence, silt sacks, cofferdams) will be installed along Shank Painter Road, Court Street, and Route 6 within the project limits upgradient of the Bordering and Isolated Vegetated Wetland areas. Erosion and sedimentation control devices will be inspected daily during construction. The filter sock will control sedimentation and erosion from the upland areas and also serve to define the limits of work.
- **Sandbag cofferdams** will be used in the Court Street wetland area and South Shank Painter wetland area as sedimentation control and to keep any standing water outside of the work zone.

- **Trench dewatering activities** will use dewatering bags at the pump discharge for sediment control and water quality. The bags will be placed outside of the project site. Filter sock will surround the bags to prevent erosion.
- **Stockpiles of aggregate** materials (sand, gravel, and stone) will be maintained on-site as needed outside of the resource areas and buffer zones. Any unsuitable material excavated will be stockpiled separately of all other construction materials.
- **Disturbed areas** will be limited to the areas within the limit of work. The limit of work was restricted to the maximum extent practicable. All disturbed areas will be stabilized and restored to original conditions with loam and seed after construction. Seeding of disturbed areas will be with a New England Conservation Seed Mix or similar, and free of fertilizers. Loam will be low nitrogen and native to the surrounding area.
- The dewatering for the Court Street Pump Station will be completed according to a MA PE stamped dewatering plan provided by the contractor.

The contractor will be responsible for preparing a stormwater pollution prevention plan, which will include information on equipment, staging and laydown location, and proposed stockpile locations.

Stormwater Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan must be developed and implemented to ensure that stormwater management systems function as designed.

Refer to Attachment 4.9 for the operation and maintenance plans for the stormwater treatment devices.

The Town of Provincetown will own and operate all maintenance of stormwater infrastructure included in this project. This includes the following:

- **Pretreatment BMPs**
  - **Deep Sump Catch Basin** – Inspection and cleaning four times per year
  - **Hydrodynamic Separators** - Inspection and cleaning at a frequency specified by the manufacturer (minimum once a year)
  - **Sediment Forebay** – Inspection monthly, cleaning four times per year, regular mowing
- **Infiltration BMPs**
  - **Dry Wells** – Annual inspection and cleaning
  - **Infiltration Basin** – Spring and Fall inspection, maintenance and cleaning
  - **Subsurface Infiltration Chambers** – Biannual inspection and cleaning
- **Pump Station Operation and Maintenance** – Example Smith and Loveless O&M Manual included

The Town will continue with their standard street sweeping operations for public roadways.

Stormwater Standard 10: Illicit Discharges to Drainage System

All illicit discharges to the stormwater management system are prohibited.

The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through MassDOT's Illicit Discharge Detection and Elimination (IDDE) Program. An illicit discharge compliance statement is attached.

Attachments:

1. **Previous Studies**
   1.1 2020 Pumping Alternatives Analysis Study

2. **Model Setup and Background:**
   2.1 Design Parameters
   2.2 Soils Data from NRCS
   2.3 Rainfall Data from NOAA
   2.4 Existing Land Use Figure
   2.5 Geotechnical Borings

3. **Model Components:**
   3.1 Existing Hydrology Map – Subcatchments and Time of Concentration
   3.2 Proposed Hydrology Map – Subcatchments and Time of Concentration
   3.3 Existing Drainage Features
   3.4 Proposed Drainage Features

4. **MassDEP Stormwater Standards**
   4.1 Standard 1: Peak Velocities
   4.2 Standard 2: Peak Flow Rates
   4.3 Standard 3: Recharge Volume Calculations
   4.4 Standard 3: Infiltration Volumes
   4.5 Standard 4: Water Quality Volume Calculations
   4.6 Standard 4: TSS Removal Calculations
   4.7 Standard 5: LUHPPL Areas
   4.8 Standard 6: Critical Areas: Outstanding Resource Waters, Vernal Pools, MassDEP Wetlands, and FEMA Flood Maps
   4.9 Standard 9: Operation and Maintenance Plan
   4.10 Standard 10: Illicit Discharge Compliance Statement

5. **Model Results**
   5.1 Existing Flood Extent Figures
   5.2 Proposed Flood Extent Figures
   5.3 Existing PCSWMM Reports
   5.4 Proposed PCSWMM Reports

ATTACHMENT 1.1

2020 Pumping Alternatives Analysis Study

ENVIRONMENTAL PARTNERS

MEMORANDUM

Date: February 17, 2021

To Richard Waldo, P.E. – Provincetown Director of Public

From Ryan Paul, PE

CC Paul Millett, PE
Robert Rafferty, PE
James Fitzgerald, PE
Maria George, EIT
Sabrina Castaneda, EIT

Subject: **Alternatives Analysis and Preliminary Design**
Court Street Flood Mitigation
Town of Provincetown, MA

Environmental Partners (EP) has prepared this preliminary design memorandum in regards to the Court Street Flooding Mitigation project. This memorandum presents the field work performed, stormwater modeling and alternatives analysis, conclusions, recommendations, and a preliminary opinion of probable construction costs.

Background

Provincetown is experiencing flooding on Court Street to depths of greater than 6" of standing water during intense storms, and greater depths under modelled severe storms. This localized flooding constantly impacts surrounding property owners and traffic. The flood area is located at the west end of Court Street near the intersection with Winthrop Street. In front of 45 Court Street is a low point where runoff from Shank Painter Road, Winthrop Street, Holway Avenue, and Court Street stormwater collects. The flooding area is shown on Photos 1 and 2.

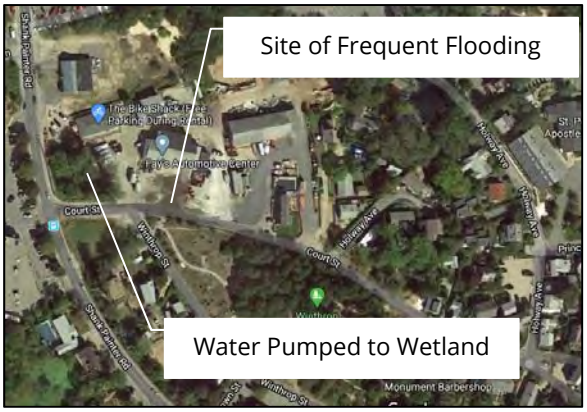


Photo 1: Flooding Area Overview



Photo 2: Flooding Area Street View (12/5/20)

In 2017 the Town and GHD completed initial field investigations. GHD suggested that a stormwater pump station would be required to mitigate flooding. Proposed preliminary drawings showed that stormwater pumps would pump water via an existing 6" asbestos cement water main to a storage area on Jerome Smith Road.

Since initial field investigations in 2017, Court Street and its surrounding area have seen several intense storms that have left the area inundated under 6" to 12" of standing flood water. The DPW currently uses temporary pumps to alleviate flooding by sending water to a nearby isolated wetland.

In February 2020, EP completed a 25% design of the Shank Painter Road and Route 6 roadway project. This project included an updated drainage network. A portion of the proposed Shank Painter Road drainage is routed to Court Street. One solution to this flooding may include a stormwater force main installed in Shank Painter Road. Therefore, this Court Street flood mitigation project will be tied in with the Shank Painter Road and Route 6 roadway project.

Field Work

EP conducted field investigations from February 2020 to December 2020. A summary of the work performed is provided below.

- February 2, 2020: EP's sub-consultant, Pinebrook Consulting, performed a delineation of the wetland areas along Court Street and Jerome Smith Road. The wetland delineation report is provided in Attachment 1.
- May 1, 2020: EP's sub-consultant, JC Engineering, completed a 75% complete professional land survey of Court Street and Jerome Smith Road. This survey is appended to the survey completed between October 3, 2018 and January 2, 2019 for Shank Painter Road and Route 6. The survey shows several utilities, including limited local drainage, gravity sewer, water main, overhead utility lines, buried telecommunication lines, and a wastewater effluent leaching field on the north side of Jerome Smith Road. A base plan showing the survey is provided in Attachment 1.
- May 28, 2020: EP completed a site walk and marked boring locations. During the site walk, EP noted water levels and checked the survey for inconsistencies.

- June 6, 2020: EP and EP's Sub-Contractor, Northern Drilling Services, performed two borings to 27' below grade on Court Street, and two borings to 17' below grade on Jerome Smith Road. Samples and blow counts were taken every 5 feet. Water was found at 3' below grade on Court Street, and 10.5' to 12' below grade on Jerome Smith Road.

  Boring logs are provided in Attachment 1. Soil composition ranged from fine to coarse sand. Soil testing will be completed in the next phase of work.

  December 6, 2020: EP conducted a second site walk. The site walk was conducted after a severe storm event that brought over 2" of rainfall to the area. EP was able to measure flood water levels on Court Street to approximately a 1' depth at the lowest point in the roadway, and were included in the model calibration. Additionally, EP measured water levels at Duck Pond and Shank Painter Pond, walked the area surrounding Duck Pond to note any existing stormwater conveyances, and walked the area to the east of the Stop & Shop parking area for a potential outfall location.

Hydrologic-Hydraulic Model Setup

EP used PCSWMM Version 7.2 for hydrologic/hydraulic stormwater modeling (the Model). PCSWMM uses the Environmental Protection Agency's (EPA) Stormwater Management Model (SWMM) as the primary model engine. The software can be used to analyze various hydrologic and hydraulic processes, such as time-varying rainfall, snow accumulation and melting, groundwater infiltration, and model pipe networks of unlimited size and various flow regimes (tail water, reverse flow, surcharging, and surface ponding).

Model Input Information

The model was set up using the January 2020 drainage design file from the Shank Painter Road and Route 6 roadway design work as a base to ensure that the proposed improvements on Shank Painter Road are reflected in the stormwater calculations for flood mitigation on Court Street. Contributing areas for runoff on Court Street and Jerome Smith Road were appended to this model. EP gathered additional data from the following sources for input into the stormwater model:

- Drainage System – Topographic and utility information was gathered from field investigations and Town records.
- Elevations – Digital elevation model (DEM) data was downloaded from the MassGIS website at http://maps.massgis.state.ma.us. The DEM file was used for sub-catchment delineation. All elevations are in NAVD88. All horizontal coordinates are in NAD83 Massachusetts State Plane.
- Soils – Soil information (for infiltration) was gathered from the United States Geological Survey (USGS) Web Soil Survey (WSS) website https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. The WSS provides soil data for stormwater analysis, such as soil types, hydraulic soil groups (HSG), and estimated infiltration rates. This data was verified using the four soil borings from the site.

- Land Use areas (for percent impervious area, surface roughness factors, and depression storage values) were developed from shape files downloaded from the MassGIS website at http://maps.massgis.state.ma.us. EP confirmed the areas by using aerial views from orthographic imagery.
- Rainfall Events – Data for the 2-yr, 10-yr, and 100-yr 24-hr rainfall events were gathered from the "Extreme Precipitation in New York & New England" website, Version 1.12 as shown in Table 1. The website is a joint collaboration between the Northeast Regional Climate Center (NRCC) and the Natural Resources Conservation Service (NRCS). A Type III Soil Conservation Services (SCS) unit hydrograph was selected to develop the rainfall distribution.

Table 1 – Rainfall Events[1]

Frequency	Total Rainfall (in)
2-year, 24-hour	3.19
10-year, 24-hour	4.74
100-year, 24-hour	8.39

1. http://precip.eas.cornell.edu/

Subcatchments, Storage, and Flow Routing Setup

Subcatchments were delineated using the PCSWMM watershed tool and the DEM layer. The total watershed that contributes to flooding on Court Street is 19.1 acres, and consists predominantly of residential areas, commercial areas, roadways and parking lots. Additionally, separate subcatchments were delineated for the wetland area north of Jerome Smith Road (herein after called the Jerome Smith Storage), and the area around Duck Pond.

Figure 1 on Page 5 shows the subcatchments and model features. Provided on Page 6 is a detailed summary of each drainage area, its modelled flow routing, and its storage areas.

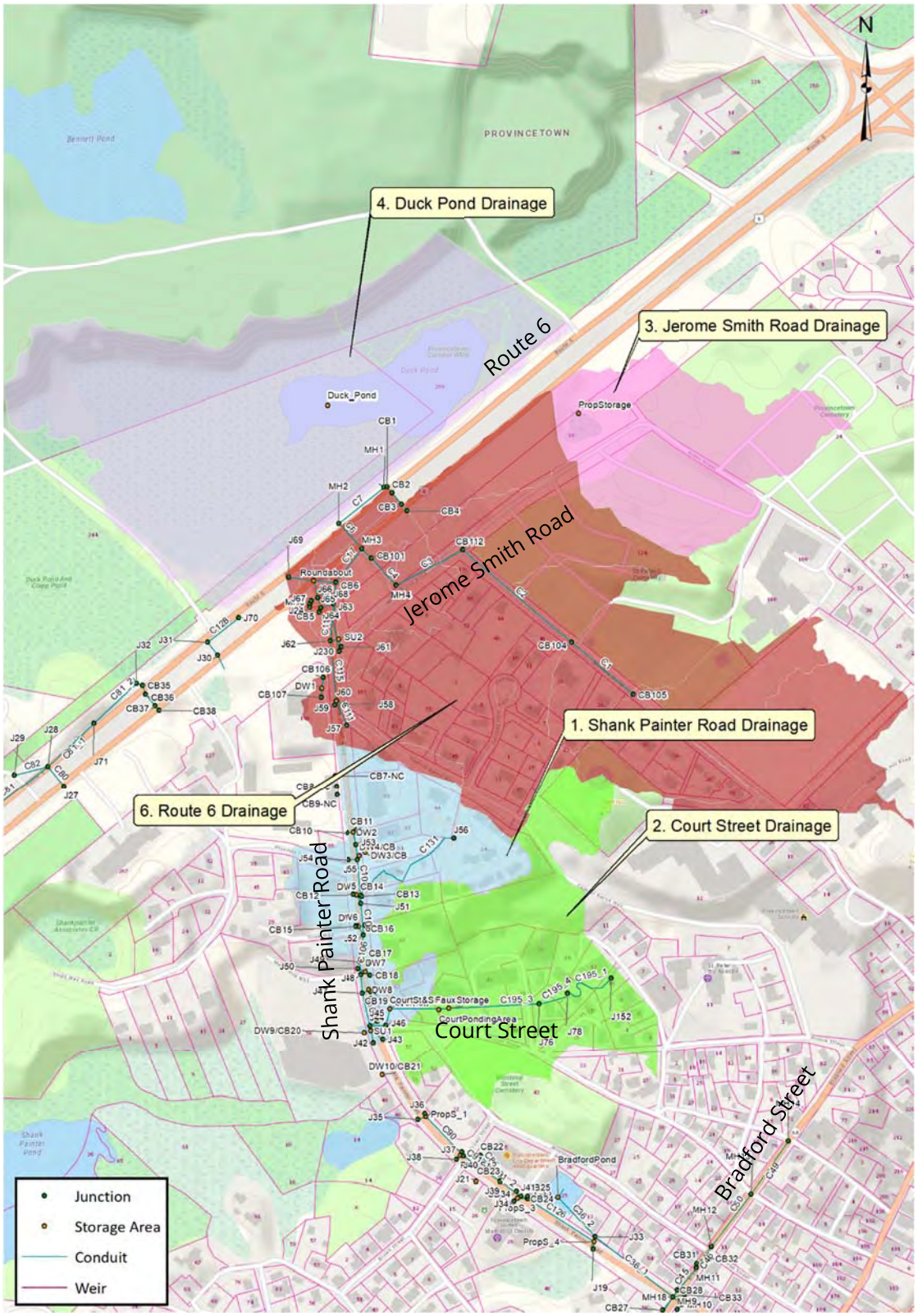


Figure 1 – Subcatchments and Model Features

1. Shank Painter Road Drainage: Located at the intersection of Shank Painter Road and Court Street is a small isolated wetland adjacent to the Court Street Flooding area. During EP's site walk, standing water was indicated at EL. 5.0'. The top of the storage area was determined from the professional land survey to be EL. 7.0'.

   The Shank Painter Road Drainage is 7.5 acres, and consists predominantly of commercial areas, roadways and parking lots. This subcatchment will be routed through the proposed drainage improvements on Shank Painter Road, which consists of overflow piping for existing and proposed infiltration structures. The overflow routing will be directed via drain piping towards Court Street. At Court Street, the flow will be discharged to the existing storage area at the intersection of Court Street and Shank Painter Road (hereinafter referred to as the Shank Painter Storage). A proposed overflow structure will collect excess water and send it to the Court Street flooding area.

2. Court Street Drainage: The total drainage area is 19.1 acres, and consists predominantly of residential areas, commercial areas, roadways and parking lots. This subcatchment encompasses Court Street and part of Winthrop Street. It runs along Holway Avenue and north to the water storage tank, including part of Captain Bertie's Way.

   All flow is routed to the low spot on Court Street. The low spot (flood area) is modeled as a large storage area that is used to determine volume and hydrographs within the flood area.

3. Jerome Smith Road Drainage: Located adjacent to and north of Jerome Smith Road opposite Saint Peter Cemetery is a large storage basin with an isolated wetland at its base. This storage area was noted in 2017 as a potential area to pump stormwater from Court Street. During EP's site walk, standing water was indicated at EL. 8.0'. The top of the storage area was determined from the professional survey to be EL. 11.55'.

   The total drainage area is 8.7 acres and includes roadways, cemetery, and wooded areas. This subcatchment encompasses the east end of Jerome Smith Road, the north end of Alden Street, part of Saint Peter's Cemetery and part of Provincetown Cemetery. Runoff travels overland and enters the pond directly or through the two local catch basins and an outfall on Jerome Smith Road.

4. Duck Pond Drainage: Duck Pond is a major surface water in Provincetown, located near the intersection of Shank Painter Road and Route 6 and bordering Route 6 to the north. The Pond is approximately 3.6 acres at its normal depth of EL. 4', and expands to 15.3 acres when the surrounding wetlands are included. The maximum elevation of the pond prior to flooding is EL. 6.1' at the footpaths along the east and west edge of Duck Pond.

   The total drainage to and including Duck Pond is 25.1 acres. The Ponds drainage is bordered by Route 6 to the south, a large hill to the north, and raised hiking trails to the east and west. Additionally, located further north is an existing capped landfill. The Pond does not appear to have direct surface hydrological connections to wetlands to east and west, which is cut off by the elevated hiking trails. Runoff travels overland from the immediate surrounding area. Most rainfall reaches the pond instantaneously due to the ponds size in relation to its relatively small catchment area.

5. Route 6 Drainage: The total drainage area is 36.7 acres and consists predominantly of residential areas, wooded areas, and parking lots. The area encompasses the intersection of Shank Painter Road and Captain Bertie's Way, as well as Jerome Smith Road and Winslow Street up to High Pole Hill Road. All flow is routed to an outfall that is proposed to discharge into Duck Pond.

6. Shank Painter Pond Drainage: Shank Painter Pond is one of the largest ponds in Provincetown, and it is designated as a great pond, located west of Shank Painter Road and adjacent to and south of Route 6. The Pond is approximately 56.7 acres at its normal depth of approximately EL. 3.0', and expands to 87.9 acres when the surrounding wetlands are included. The maximum elevation of the pond prior to flooding is approximately EL 4.0'. The drainage area for the Pond was not modelled for this analysis. Because of the Pond's large surface area (greater than 50-acres), the Court Street flood volumes would have minimal impact on the Pond's water levels.

Model Assumptions

EP made the following assumptions to create the model.

- Subcatchment delineations were based on the DEM contour elevations.
- For subcatchments with no boring information, EP assumed soils within the area were similar to the USGS Web Soil Survey website soil data.
- Modeled storage areas have a starting water level corresponding to the level observed on EP's walk during the months of May and December. Storage areas below the water level area is unusable storage for modeling purposes.
- Duck Pond is not hydraulically connected to other nearby waterbodies.

Storage Volumes

EP calculated the volume of the existing potential stormwater storage areas described on Pages 6 and 7. Storage volume calculations included available storage above the observed water level and up to 6" freeboard below the top of the storage. The Jerome Smith Drainage and Duck Pond Watershed local runoff volumes were added to their respective storages, which decreased the amount of useable storage volumes. Shank Painter Pond storage excluded local runoff for this analysis.

The Model was run using 2yr24hr and 10yr24hr storm events to determine the approximate amount of existing flooding at Court Street and the surrounding area. Table 2 shows the total modelled flooding volume based on the lowest elevation of Court Street (EL. 5.26'), compared to available storage areas. Attachment 2 shows the storage areas along with the information provided in Table 2.

Table 2 – Flooding Volumes and Existing Storage

Storm Frequency	Court St. Flood Volume (MG)	Jerome Smith Available Storage (MG)[1]	Duck Pond Available Storage (MG)[1]	Shank Painter Pond Available Storage (MG)[2]
2yr24hr	**0.61**	0.60	4.99	1.9
10yr24hr	**0.98**	0.57	4.74	1.9

1. Available storage includes 6" freeboard, and the storages account for local runoff.
2. Available storage does not include local runoff.

In addition to the analysis above, underground storage detention is possible on a private parcel at 57 Shank Painter Road, located at the corner of Shank Painter Road, Court Street and Winthrop Street, across Court Street from the Shank Painter Storage site. The potential available space within the parcel limit is approximately 6,000-sf. Assuming a 10' deep underground storage structure, the maximum total volume available is approximately 60,000-cf or 0.45-MG. However, due to the approximate groundwater elevation at approximately EL. 3' (2.26' below ground surface), infiltration is not possible. The underground storage will require waterproofing, and the underground storage structure will require a pump to drain the basin.

Stormwater Runoff Flow Rates

Stormwater runoff from the Shank Painter Road and Court Street Drainage converge on Court Street. The combined peak flow from these contributing areas is used in the gravity and pumped drainage design alternatives considered in this analysis. The peak flow rates are shown in Table 3, and the corresponding hydrograph is shown in Figure 2.

Table 3 – Peak Flow Rates

Frequency	Peak Flow Rate (cfs)
2-year, 24-hour	23.9
10-year, 24-hour	35.3
100-year, 24-hour	52.7

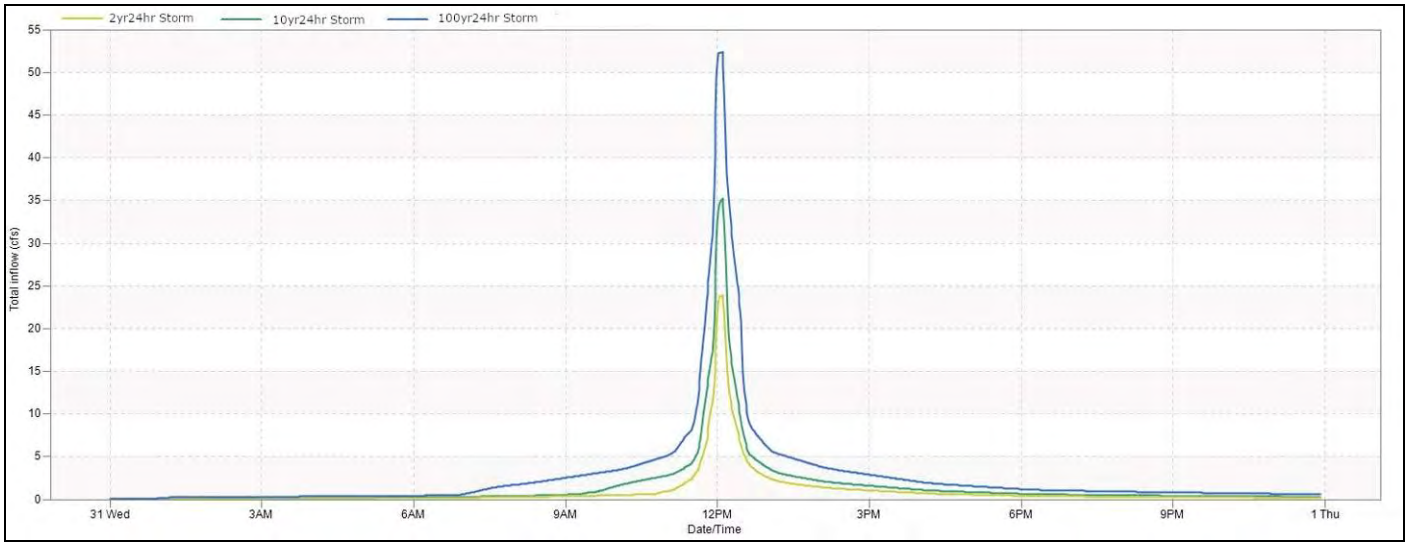


Figure 2 – Court Street Flooding Hydrograph

Minimum Required Pumping and Site Storage Analysis

EP evaluated pumping rates based on the hydrograph and runoff volumes at the Court Street Flooding area as shown in Table 3 and Figure 2. EP compared pumping rates to various on-site storage volumes to understand the trade-offs between the size of pumping systems and storage volumes. The pumping rates, and pumping system size and cost, can be reduced by detaining and holding stormwater on-site during storm peaks (the more on-site storage that is available, the lower the necessary pump flows). EP evaluated several pumping flows using the 2yr24hr and 10yr24hr hydrographs, and calculated the amount of on-site storage required. Figures 3 and 4 show the relationship between pumping rate and storage.

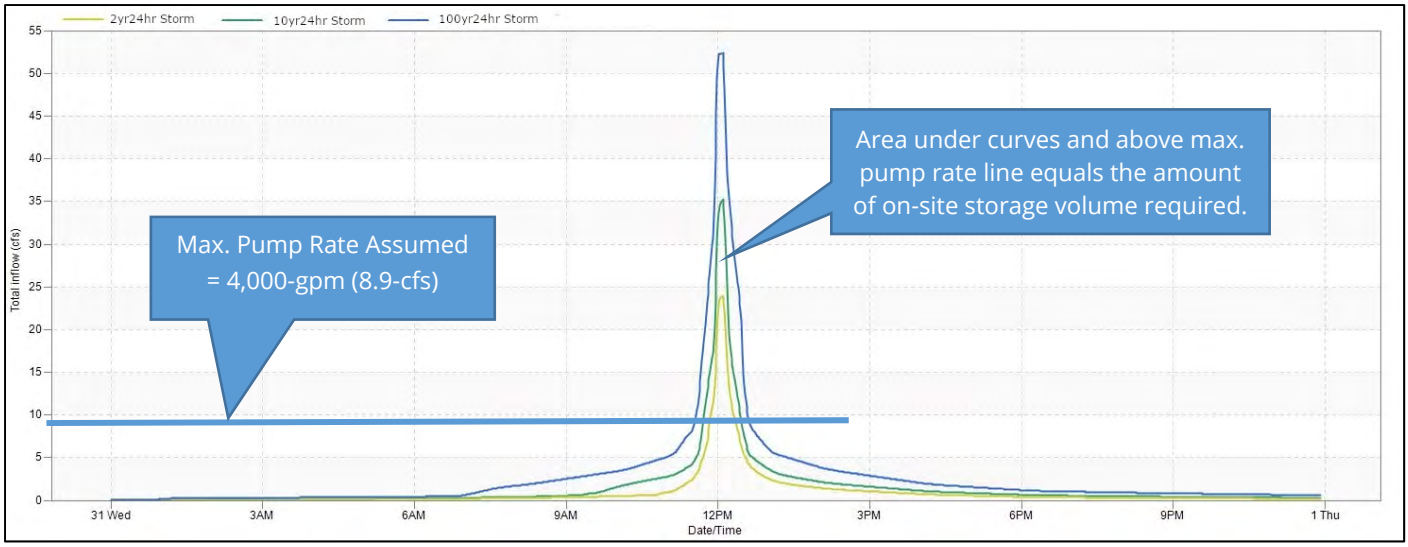


Figure 3 – Court Street Flooding Hydrograph with Selected Maximum Pump Rate

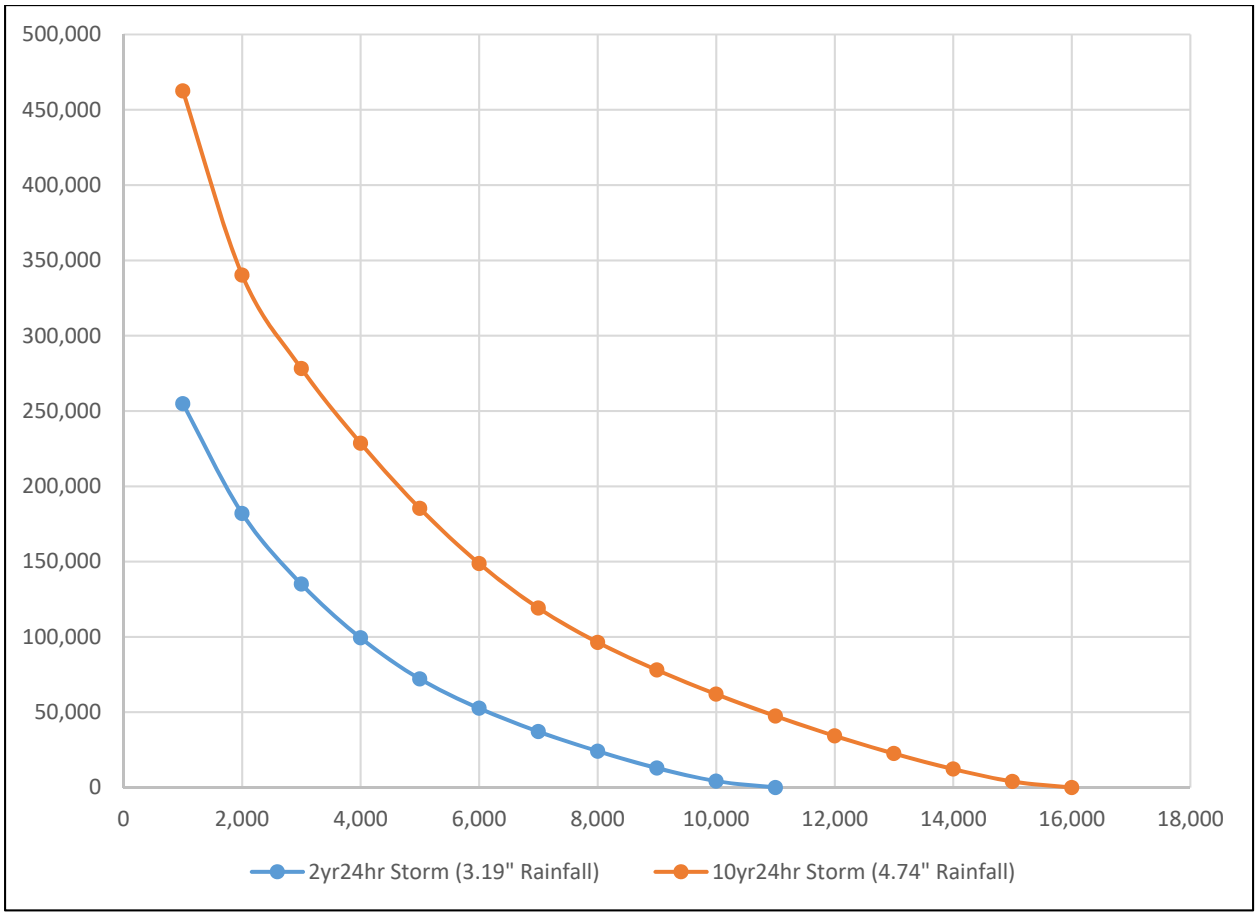


Figure 4 – Maximum Pump Flow Rate (gpm) and Required On-site Storage (Gallons)[1, 2]

1. Calculations based on modelled 10yr24hr and 2yr24hr storm hydrographs at Court Street and expansion of Jerome Smith Storage.
2. Calculations exclude the storage volume in the pump discharge force main.

Figure 4 shows that constructed storage volumes for most pumping rates would be prohibitively large. For example, to capture the runoff from a 10yr24hr storm at an exceptionally large pumping rate of 11,000 gpm (~16 MGD) the constructed storage volume would be 50,000 gallons, or almost 7,000 cubic feet (with a depth of 10', the structure would be at least 25' x 25').

EP then calculated the available flood volume under existing conditions (no constructed storage) and selected a representative pumping rate that would limit the flooding to a short duration and would protect private structures. As shown in Figure 3, EP selected a more manageable 25,000-gal underground storage structure and a 4,000-gpm maximum pumping rate. According to Figure 5, at 4,000-gpm with a 25,000-gallon constructed storage chamber, the Town can expect to see reduced flooding on Court Street. Figure 5 shows the amount of flooding that can be expected during the 2yr24hr and 10yr24hr modelled storms.

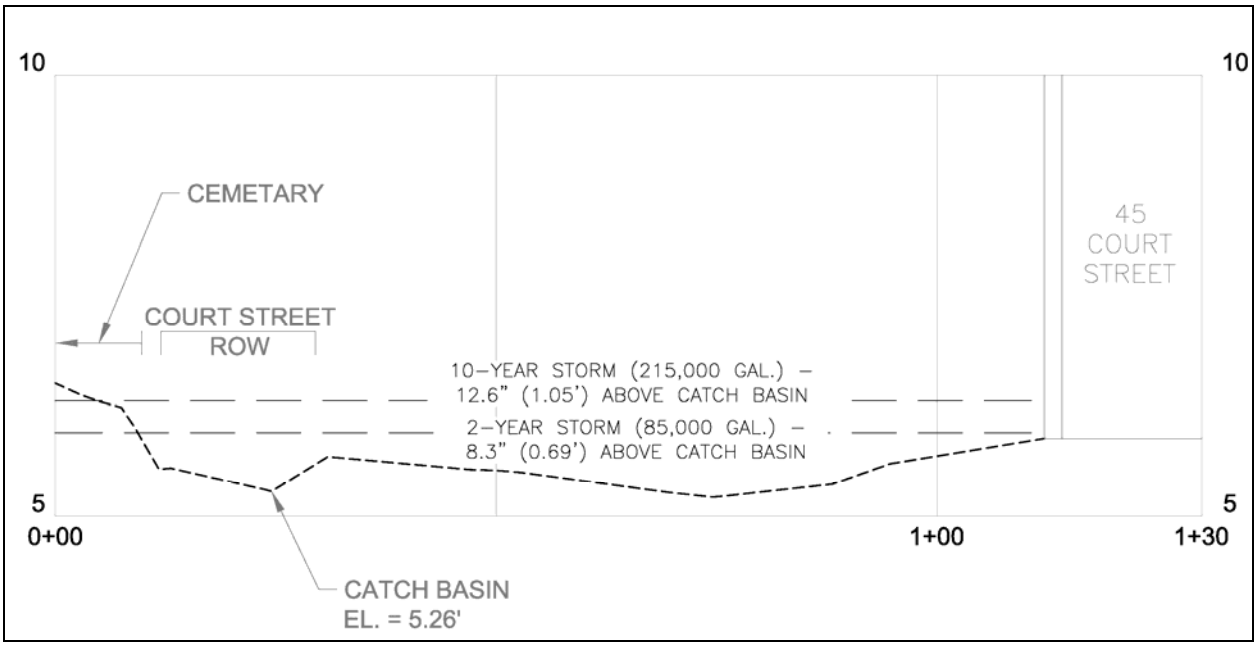


Figure 5 – Potential Flood Impacts with Proposed 4,000-gpm Pump Station and 25,000-gal Storage Area

EP calculated that a 2yr24hr storm will reach the base of the building at 45 Court Street at EL. 5.95', or 0.69' above the low point at the existing catch basin on Court Street. The proposed flood volume is a 0.90' reduction in flood depth and an 86% reduction in flood volume. The proposed pumps will completely remove the flooding from the area in less than 0.5-hours after the peak intensity period.

EP calculated that a 10yr24hr storm reaches 0.36' (4.3") above the base of the building at 45 Court Street at EL. 6.31', or 1.05' above the low point at the existing catch basin on Court Street. The proposed flood volume is a 0.86' reduction in flood depth and a 78% reduction in flood volume. The proposed pumps will completely remove the flood volume from the area in less than 1-hour after the peak intensity period.

While the proposed pumping rate and storage capacity are not completely protective of private property during the 10yr24hr design storm, the improvements are extensive, and the model

provides a proof of concept. A refined selection of pumping rate and pump station configuration will be determined in later stages of design.

A pump station with the capability to convey 4,000-gpm will typically be constructed with a separate pump room (dry well) and wet well, with an above-grade structure over the dry well. The station will most likely need to be located on the private parcel at 57 Shank Painter Road, or on the lot of the parcel experiencing the most flooding (45 Court Street). EP recommends incorporating the following design features into a pump station design:

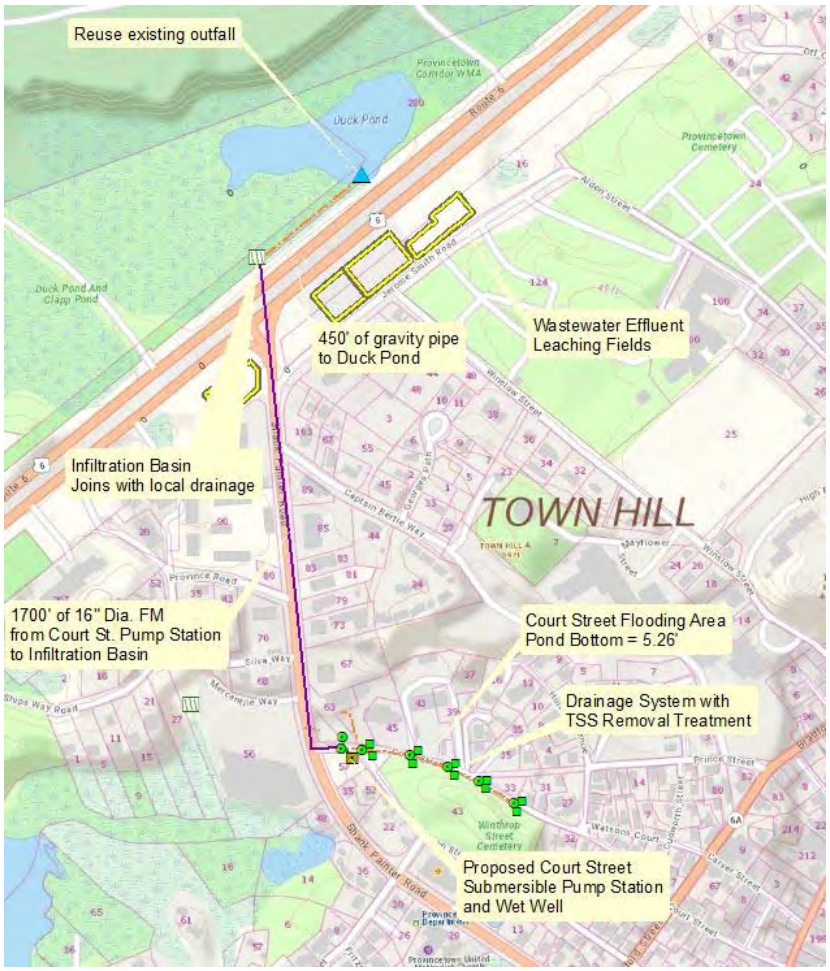
- A stormwater pump station capable of pumping approximately 4,000-gpm. A series of pumps should be capable of handling storms of varying intensities. EP recommends installing two pumps, when running together, that will produce the selected pumping rate. The Town may decide to provide redundancy, which state regulations do not require, by adding a third pump.
- An on-site underground concrete wet well with a storage volume of approximately 25,000-gal. Based on a storage depth of 10', the footprint will be approximately 16' by 22', which will be finalized during design based on the dimension of the dry well. The wet well will be waterproofed, since it will be located below groundwater.
- Shank Painter Road drainage should outlet to the Shank Painter Storage with a constructed weir overflow to the proposed pump station's underground storage. Routing stormwater to this existing storage area will reduce peak flows and the amount of underground storage required, while utilizing this storage area to the maximum extent practicable.
- The construction of a new gravity drainage system on Court Street that is capable of handling storm flows up to the 10yr24hr storm. Additionally, catch basins most likely are required on private property at 45 Court Street to catch stormwater at low elevations. An easement will be required to install drainage (or a pump station) on the private land.
- Pretreatment devices, such as a hydrodynamic separator (e.g. Stormceptor, Aqua-Swirl, etc.), will be required prior to entering the proposed underground storage system to reduce TSS and debris build-up. Sand/sediment traps should be incorporated into drainage structures and at the inlet to the new wetwell.
- The construction of a 1,700-ft, 16" diameter force main. This pipe diameter will provide the velocity necessary to re-suspend solids with a single pump running, while also providing an acceptable operating condition for pumps running in parallel. A prior report suggested that an existing 6" diameter AC water main on Shank Painter Road could be used as the stormwater force main. However, EP's preliminary pump calculations suggest that the existing 6" AC water main is too small to convey flows up to 4,000-gpm.
- Velocity controls, and a stilling basin will be required at the force main outlet to reduce velocities prior to entering the water body or infiltration pond.

Alternatives Analysis

EP analyzed six (6) alternatives to mitigate flooding along Court Street, including on site storage, gravity flow, and pumping flow from Court Street to the available storage areas on Jerome Smith Road, Duck Pond, and Shank Painter Pond. The alternatives have been listed from 1, being the most favorable, to 6, being not favorable. Some alternatives explore the option of significantly sized constructed on-site storage, which EP believes to be prohibitively expense, to present the full suite of alternatives that EP evaluated.

1. Pump to Duck Pond with Limited Flooding

This alternative included pumping from Court Street as described in the pump and site storage analysis section. In this alternative stormwater is conveyed into a 25,000-gal wet well via a proposed local gravity drainage system; a pumping capacity 4,000-gpm will convey water from Court Street to Shank Painter Road and discharge near the intersection of Route 6 and Shank Painter Road, where it will enter gravity pipe drainage to a re-constructed existing outfall on Route 6 to Duck Pond. As described in the pump and site storage section, short duration flooding will still occur during extreme storm events for a short duration (approximately 1-hour for flooding during a 10yr24hr storm). This alternative provides a more economical approach to flood mitigation on Court Street.


Reuse existing outfall
Duck Pond
Province Lands Conservation Area
Route 6
Province Lands Visitor Center
Province Lands Trail
Province Lands Bike Trail
Province Lands Trail
Province Lands Trail
Province Lands

Advantages/Disadvantages of Alternative 1:

- Advantages:
    - The costs of this alternative are less than Alternative 2.
    - Duck Pond has the most available storage, 4.74-MG. The amount required to mitigate flooding during a 10-year storm is 0.98-MG.
    - The entire volume of the 10yr24hr storm can be pumped to Duck Pond, which leaves additional capacity for back-to-back storms.
    - Duck Pond is not located in the 100-year FEMA Flood Plain, which Shank Painter Pond is in.
    - Duck Pond is not a Great Pond. Chapter 91 permitting will not be needed.
    - A new outfall is not required. An existing outfall can be reused and upgraded on Route 6.
    - Most of the discharge force main pipe, and gravity discharge pipe are located within the limits of the Shank Painter Roadway project. There may be additional costs savings if the Town is able to cover the costs for this portion of the project under the Shank Painter Roadway project.
    - There will be a 78% reduction in flood volumes.
    - An economical approach to mitigating typical flooding.

Disadvantages:

- Larger pumps are required than in Alternative 2 because of the smaller underground storage space. This will lead to increased operational costs in the future.
- In all alternatives, the pump station is recommended to be designed to allow short term flooding to occur as described in the pump and site storage section.
- Court Street will still see limited short term flooding above the 2yr24hr storm, with potential impacts to the building on 45 Court Street during the 10yr24hr storm.

2. On-site Underground Storage Combined with Pumping to Jerome Smith Storage

This alternative considered a pump station scenario with on-site underground storage. The vacant private lot at 57 Shank Painter Road would be used to store stormwater up to 0.45-MG in a waterproofed concrete structure. This underground storage combined with the 0.57-MG available storage at the Jerome Smith Storage is adequate storage volume to meet the 10yr24hr storm flood volumes of 0.98-MG coming from Court Street.

Unlike Alternative 1, stormwater is conveyed into a larger 0.45-MG underground storage that will also be used as the wet well via a proposed local gravity drainage system; pumps sized for the 10yr24hr storm will convey water from Court Street, to Shank Painter Road, to Jerome Smith Road, and discharge to the Jerome Smith Storage. A new outfall will be required at the discharge point with a stilling basin to reduce flow velocities prior to entering the wetland.

Advantages/Disadvantages of Alternative 2:

- *Advantages*:
    - Pumping capacities required are approximately 2,000-gpm, which is half the required capacity needed in Alternative 1 due to the large underground storage.
    - The volume of available storage is capable of providing flood mitigation on Court Street up to the 10yr24hr storm.
    - No limited short term flooding on Court Street up to the 10yr24 storm.
- *Disadvantages*:
    - The costs of Alternative 2 are greater than Alternative 1, due to costs of the large 0.45-MG underground storage structure.
    - Wastewater effluent leaching fields are located adjacent to the Jerome Smith Storage. The increased water levels within the Jerome Smith Storage could have an impact on the functionality of the wastewater leaching fields.
    - There is not enough available storage for a back-to-back storm. If Jerome Smith Storage and the underground storage are full, Court Street will flood. This will require level sensors and pump interlock controls.
    - Rights to 57 Shank Painter will be required to construct the pump station and wet well. There is not enough space for construction within the right-of-way on Court Street.
    - A small portion of the project is located within the limits of the Shank Painter Roadway project and may not be available for funding from MassDOT.
    - The addition of SCADA and Instrumentation will be required at the Jerome Smith Storage and the pump station to ensure that pumps turn off when Jerome Smith Storage is full.

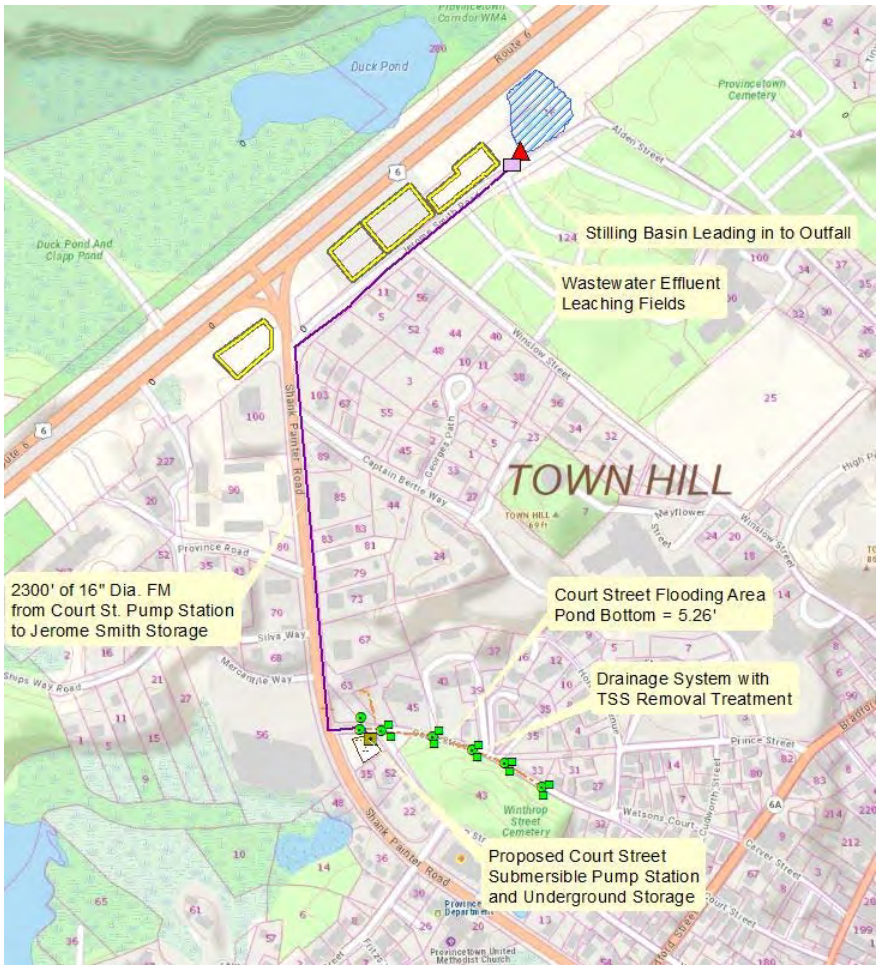


Figure 7 – Alternative 2
"On-site Underground Storage Combined with Pumping to Jerome Smith Storage"

3. Pump to Shank Painter Pond via Stop & Shop Parking Lot with Limited Flooding

Alternative 3 included pumping from Court Street as described in the pump and site storage section. In this alternative, similar to Alternative 1, stormwater is conveyed into a 25,000-gal wet well via a proposed local gravity drainage system; pumps will convey water from Court Street, across Shank Painter Road, through the private parking lot for Stop & Shop and other businesses at 56 Shank Painter Road, and discharge in the northwest corner of 56 Shank Painter Road. The flow is proposed to discharge to a stilling basin to reduce flows, and enter a wetland gully that allows for naturally conveyed flow to Shank Painter Pond. As described in the pump and site storage section, short duration flooding will still occur during extreme storm events for a short duration (approximately 1-hour for flooding during a 10yr24hr storm).

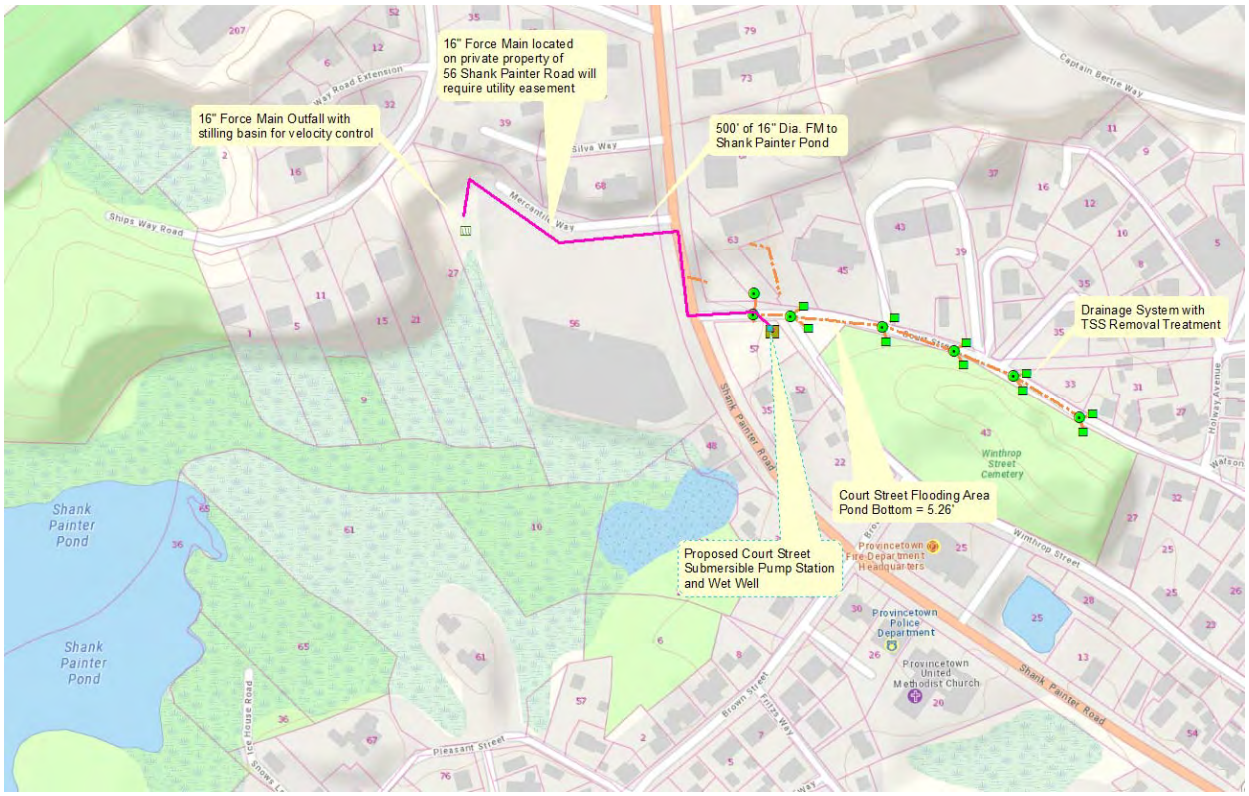


Figure 8 – Alternative 3 "Pump to Shank Painter Pond via Stop & Shop Parking Lot"

Advantages/Disadvantages of Alternative 3:

- *Advantages*:
    - The costs of this alternative are less than Alternatives 1 and 2.
    - Adequate available capacity exists in Shank Painter Pond, 3.8-MG, during the 10yr24hr storm. The amount required to mitigate flooding during a 10-year storm is 0.98-MG.
    - The entire volume of the 10yr24hr storm can be pumped to Shank Painter Pond, which leaves additional capacity for back-to-back storms.
    - A natural gully in back of the parking area of Stop & Shop allows for an ideal location for the force main outfall. Additionally, ground elevations at the discharge location are higher than the Shank Painter Pond, which provides a natural sloped watercourse to Shank Painter Pond.

Disadvantages:

- Shank Painter Pond is a Great Pond (greater than 10 acres), which is regulated by the Massachusetts Department of Environmental Protection (MassDEP) and requires Chapter 91 Permitting.
- The Shank Painter Pond is a highly sensitive conservation resource, and it will likely be highly scrutinized by abutters, regulators, and the local conservation commission.

- Shank Painter Pond is surrounded by many businesses and residential properties. Raising water levels (even by one or two inches), may raise concerns by abutters.
- Shank Painter Pond is located within the 100-year FEMA Flood Plain, which Duck Pond is not. The area, along with Court Street is estimated to flood during a 100yr24hr storm.
- In all alternatives, rights to 57 Shank Painter will be required to construct the pump station and wet well. There is not enough space for construction within the right-of-way on Court Street.
- A permanent easement will be required for 56 Shank Painter Road to install a 16" diameter force main and concrete stilling basin at the outlet.

4. Pump to Jerome Smith Storage with Allowed Permanent Flooding

This alternative considered a pump station scenario with no on-site underground storage. The pump station setup would be designed for the 2yr24hr storm with a small wet well. Alternative 4 allows Court Street to flood during major storms above 2yr24hr storm frequency. The alternative allows for reduced construction costs, while maintaining flood mitigation for the majority of storms. Pumps sized for 4,000-gpm will convey stormwater from Court Street, to Shank Painter Road, to Jerome Smith Road, and discharge to the Jerome Smith Storage. A new outfall will be required at the discharge point with a stilling basin to reduce flow velocities prior to entering the wetland.

Advantages/Disadvantages of Alternative 4:

- *Advantages*:
  - Lower costs than Alternatives 1, and 2.
  - Reduced footprint size due to the removal of the 0.45-MG wet well provided in Alternative 2.
- *Disadvantages*:
  - Flooding will still occur above the 2yr24hr storm. There is not enough available storage at the Jerome Smith Storage for a back-to-back storms above the 2yr24hr storm. If Jerome Smith Storage is full, Court Street will flood.
  - Wastewater effluent leaching fields are located adjacent to the Jerome Smith Storage. The increased water levels within the Jerome Smith Storage could have an impact on the functionality of the wastewater leaching fields.
  - A small portion of the project is located within the limits of the Shank Painter Roadway project and may not be available for funding from MassDOT.
  - The addition of SCADA and Instrumentation will be required at the Jerome Smith Storage and the pump station to ensure that pumps turn off when Jerome Smith storage is full.

5. Pump to Jerome Smith Storage with Overflow to Duck Pond

EP reviewed an alternative that includes Alternative 4, which discharges to the Jerome Smith Storage, and an overflow gravity drain pipe that would run under Route 6 from Jerome Smith Storage to Duck Pond. EP has reviewed the elevations between Duck Pond and the Jerome Smith Storage. Our conclusion was that any gravity pipe would discharge below Duck Pond's existing water level of EL. 4'. Therefore, EP determined that this alternative was not favorable because tail waters from Duck Pond will create poor flow conditions and maintenance issues for the Provincetown DPW.

6. On Site Storage Using 57 Shank Painter Road with Gravity Drainage to Shank Painter Pond

EP evaluated the potential for drainage by gravity flow from Court Street to Shank Painter Pond. The low elevation on Court Street is 5.26'. Shank Painter Pond water levels behind the B-Street Community Garden are at an elevation of approximately 4' based on EP's visual observations in May 2020. Standard minimum depth of bury for pipes is two feet. Assuming a 24" diameter pipe is required to convey stormwater flows, the pipe invert elevation at Court Street is approximately EL. 2'. At a minimum slope of 0.005-ft/ft and an assumed minimum length of 500', the discharge invert elevation at Shank Painter Pond was calculated as EL. (-0.5'). The elevation of the discharge pipe in this scenario is completely submerged. EP has deemed this alternative not favorable due to constructability constraints, the lack of infiltration, and minimal storage.

Opinion of Probable Construction Costs

A detailed planning level opinion of probable construction costs are provided in Attachment 4 for Alternatives 1 through 4. The following assumptions are included in the cost estimate presented in Table 4:

- Unit prices are based on vendor information and EP bid results from the past two years. Costs are calculated as present day costs.
- Costs to obtain the rights to construct on 57 Shank Painter Road, 56 Shank Painter Road, and 45 Court Street are not included in the estimate.
- A 25% construction contingency was added to reflect the level of uncertainty at the preliminary design level.
- Total Construction costs are rounded up to the nearest thousand.
- Engineering construction services are estimated at 20% of the total construction cost and rounded up to the nearest thousand dollars.
- There is potential for costs saving by including portions of this project within the cost of the Shank Painter Roadway project with MassDOT.

Table 4 – Preliminary Opinion of Probable Construction Costs

	ALT 1: Pump to Duck Pond with Limited Flooding	ALT 2: On-Site Underground Storage Combined with Pumping to Jerome Smith Storage	ALT 3: Pump to Shank Painter Pond via Stop & Shop Parking Lot with Limited Flooding	ALT4: Pump to Jerome Smith Storage with Allowed Permanent Flooding
Construction Sub-Total[1]	*$2,397,000*	*$4,104,000*	*$1,773,000*	*$2,219,000*
25% Construction Contingency	*$599,000*	*$1,026,000*	*$443,000*	*$530,000*
Engineering Construction Services (20%)	*$599,000*	*$1,026,000*	*$443,000*	*$530,000*
Total Construction Costs	**$3,595,000**	**$6,156,000**	**$2,806,000**	**$3,179,000**

1. Construction cost breakdown provided as a separate document in Attachment 4.

The costs should be increased/decreased using the Turner Index inflation factors and market conditions when the timeframe of the phases is finalized. The current Turner Index for 3rd Quarter 2020 is 1171.

Conclusions and Recommendations

Alternatives 1 through 4 are all technically viable options. EP considered Alternative 1: "Pumping to Duck Pond with Limited Flooding," the most favorable option, and it is our recommended Alternative. Alternative 1 provided flood mitigation up to the 10yr24hr storm with limited flooding and limited impacts to the surrounding area, and costs significantly less than the second most favorable alternative.

Alternative 1 included pumping from Court Street as described in the Alternatives Analysis section. Stormwater is conveyed into a 25,000-gal wet well via a proposed local gravity drainage system. Pumps that are sized based on allowable flooding (pumping capacity of approximately 4,000-gpm) will convey water from Court Street to Shank Painter Road and will discharge near the intersection of Route 6 and Shank Painter Road, where it will enter gravity pipe drainage to a re-constructed existing outfall on Route 6 to Duck Pond.

The Town can expect some limited flooding to occur during extreme storm events. The proposed flood volume is a 0.90' reduction in flood depth and an 86% reduction in flood volume. Flooding will be permanently removed from the area by the proposed pumps in less than 0.5-hours under most storms; and the proposed flood volume is a 0.86' reduction in flood depth and a 78% reduction in flood volume. The flooding will be removed from the area by the proposed pumps in less than 1-hour.

EP recommends proceeding with Alternative 1 into the next phases of design and permitting. The following recommendations should be incorporated into the final design.

Modeling Update Recommendations

- Based on Alternative 1's preliminary design, EP recommends building out the Model to confirm the sizing of pumps, force main, gravity drainage components, and to simulate anticipated flooding with a 2d model. The updated model should include the localized drainage, 25,000-gal wet well, pump configuration, force main, flow dissipation discharge, gravity piping, and outfall into Duck Pond. The model should be run under 2yr24hr, 10yr24hr, 100yr24hr storms, and two additional minor storms of 0.5" and 1" rainfall in a 6-hour period to confirm pump sizing.
- Develop an existing conditions model for the 2yr24hr, 10yr24hr, and 100yr24hr storms. These models will be used for Notice of Intent filing.
- Develop a stormwater report in compliance with the MassDEP Stormwater Standards.

Design Drawings Recommendations

- Create 50% design drawings. The drawings will be completed using the completed professional survey AutoCAD base plans (Attachment 1). The drawings will utilize the MassDOT standard design template for ease of use with the Shank Painter and Route 6 Roadway Restoration TIP project design. Drawings will include base plans, cover sheet, general notes, legends, proposed plan and profile views, and detail sheets for use as permitting documents.

Court Street Site Recommendations

- A series of drainage catch basins and manholes along the gutter line of Court Street are needed to intercept and collect additional flow on Court Street. The majority of surface runoff that contributes to Court Street flooding can be collected within the ROW. However, runoff that pools directly on the private property of 45 Court Street will not be collected. EP recommends adding at least one catch basin at the lowest elevation of 45 Court Street.
- A portion of the Shank Painter Road project's drainage will be tied into the Court Street Pumping System. EP recommends that drainage from Shank Painter Road be connected directly to the Shank Painter Storage. A structure, such as a raised catch basin with a beehive grate or weir is recommended to catch any overflow for this storage area. The overflow device will direct the stormwater from the Shank Painter Storage directly to the new underground wet well. This area is an isolated vegetated wetland.
- To protect the underground storage and pumping systems, pre-treatment is recommended within the local drainage system. This consists of deep sump catch basins, oil/grit separators, settling chambers, and/or Stormceptors to reduce total suspended solids by at least 80%.
- All viable alternatives include pumping. EP recommends that any proposed pump station be located off of the roadway. A portion of the privately owned land of 57 Shank Painter Road would be adequate, or on the lot of the parcel experiencing the most flooding (45 Court Street. The pump station is recommended to include a station capable of conveying 4,000-gpm, which will typically be constructed with a separate pump room (dry well) and wet well, with an above-grade structure over the dry well. An emergency generator, on-site fuel storage, electrical and instrumentation panels, and a security fence are recommended. However, the Town has discussed with EP the removal of proposed emergency electrical power. Currently, Eversource is constructing a state of the art battery backup for the Town. The battery backup is expected to provide 10-hours of back-up power in the winter and up to 3-hours in the height of summer season. The new emergency backup batteries by Eversource is an alternative for emergency backup, but will not protect the pump station from local power losses, and may not provide the run-time required (3-hours battery backup in summer peak months).

Anticipated Permitting

- Local Conservation Commission Notice of Intent (NOI): All Alternatives will require NOI filings. Once the Town has chosen an alternative, EP will start the process with the Conservation Commission to introduce them to the design concept.
- Chapter 91 Permit: Alternative 3 will likely require a MassDEP Chapter 91 Permit and License for construction along Shank Painter Pond. This process can take from 6 to12 months from start to finish.
- Massachusetts Endangered Species Act (MESA) File Review: Alternatives 1, 2, and 4 will require MESA filing. This can be accomplished as part of the NOI process. Duck Pond and the Jerome Smith Storage are both located within a Priority Habitat of Rare Species, and Estimated Habitat of Rare Wildlife.

- Massachusetts Historical Commission Project Notification Form (MHC PNF): For projects requiring any state review, such as MESA File Review or Chapter 91, a MHC PNF is required.
- MassDOT Construction Access Permit is not required. The proposed work on Route 6 is Town of Provincetown right-of-way.

Anticipated Land Acquisition

- #57 Shank Painter Road: This property is a triangular property located at the intersection of Court Street and Shank Painter. Property records show this private property extending through Court Street. EP's professional surveyor, JC Engineering, was not able to locate a right-of-way for Court Street. It is recommended that the Town pursue the purchase of this parcel, or gain an easement on 45 Court Street, for the location of a stormwater pump station and wet well. The vacant parcel is approximately 0.51 acres total.
- #45 Court Street: EP recommends that a catch basin be located on this property at a low point to collect stormwater runoff that typically collects there. If the Town agrees, a permanent utility easement will be required for construction and maintenance of the catch basin and drain pipe. The easement would be approximately 20' in length by 10' wide. 45 Court Street may also be an alternative location for pump housing.
- #56 Shank Painter Road (Stop & Shop Supermarket parking area): If the Town pursues the design of Alternative 3, "Pumping to Shank Painter Pond," a permanent utility easement will be required from Shank Painter Road to the outlet location. The easement would measure approximately 300' in length by 10' wide.

Attachments:

1. Field Information (Wetland Delineation Report, Survey Base Plans, Boring Logs)
2. Storage Analysis Figure
3. Schematic Design
4. Opinion of Probable Construction Costs

ATTACHMENT 1

Field Information
(Wetland Delineation Report, Survey Base Plans, Boring Logs)

PINEBROOK CONSULTING

February 19, 2020

ENVIRONMENTAL PARTNERS GROUP
1900 Crown Colony Drive, Suite 402
Quincy, Massachusetts 02169
Attention: Benny Hung/Joshua Crabb, Project Engineer

RE: Wetland Evaluation/Delineation for Shared Bicycle Path Project
Jerome Smith Road/Court Street, Provincetown, Massachusetts

Dear Benny/Joshua:

On February 2, 2020; at your request; I identified/delineated the wetland resource areas; as defined under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131, Section 40) and the associated regulations, 310 CMR 10.00 (Regulations) and the Town of Provincetown Wetlands Protection By-law (By-law); in the vicinity of the above-referenced roadways (Project Area). Specifically, the stretch of Jerome Smith Road from Shank Painter Road to Alden Road; and the stretch of Court Street from Shank Painter Road to Holway Avenue (Project Area). The purpose of the delineation was to identify the wetland resource areas within the jurisdictional 100-foot buffer zone of the work to be conducted for the Shared Bicycle Path Project proposed by the Town of Provincetown. The following provides a description of my findings.

Two resource areas; one defined under Section 10.55 of the Regulations and under the By-law as bordering vegetated wetland (BVW); and two resource areas defined as isolated vegetated wetlands (IVW's) under the By-law; were identified at three different locations in the Project Area (one on Jerome Smith Road; two on Court Street). Each of the resource areas was flagged in the field with pink flags labeled WFA-1 thru WFA-13; WFB-1 thru WFB-11; and WFC-1 through WFC-8 (see attached sketch of the wetland flags). The BVW and IVW's within the Project Area are fairly well-defined by the slope and/or the presence of wetland and transitional plant species such as: red maple (Acer rubrum), white pine (Pinus strobus), pitch pine (Pinus rigida) and white oak (Quercus alba) trees/saplings; willow (Salix, spp.), bayberry (Myrica pensylvanica), green brier (Smilax glauca), common buckthorn (Rhamnus frangula), highbush blueberry (Vaccinium corymbosum), huckleberry (Gaylussacia baccata), grape (Vitus, spp.), multiflora rose (Rosa multiflora), Japanese knotweed (Polygonum cuspidatum) and bittersweet (Celastrus orbiculata) in the shrub/vine layer; and cinnamon fern (Osmunda cinnamomea), sensitive fern (Onoclea sensibilis), poison ivy (Toxicodendron radicans), dewberry (Rubus hispidus) and cattails (Typha, spp.) in the herbaceous layer. The BVW and IVW's are also characterized by other hydrological indicators such as standing water,

buttressed roots and saturated/hydric soils. Although the IVW's both have an inlet pipe, they are actually isolated by the abutting developed properties and not connected to another resource area. It is my understanding that the wetland flags are to be surveyed in the field and put onto a Plan to be submitted with a Notice of Intent (NOI) for the proposed work.

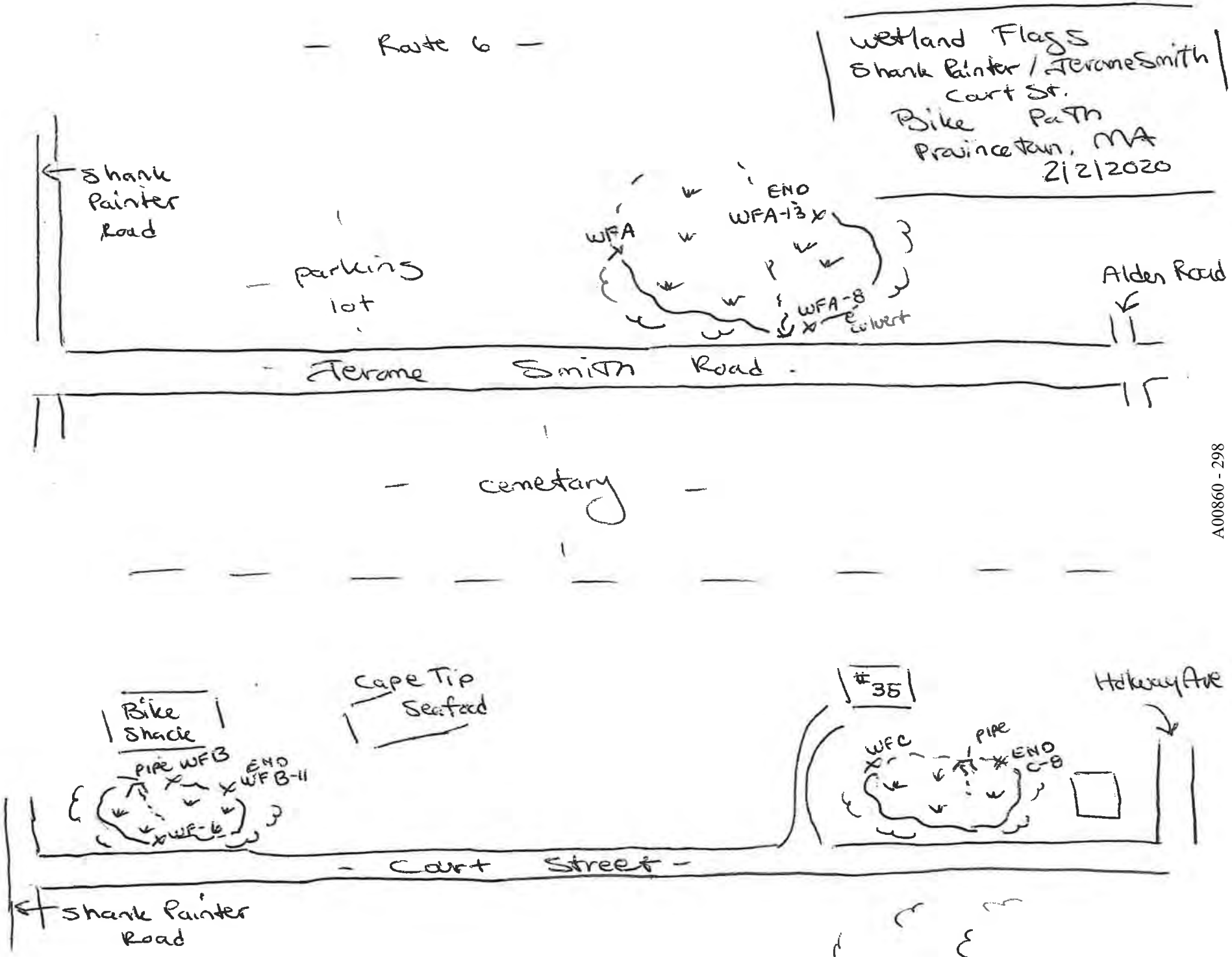
According to the most recent Massachusetts Natural Heritage Atlas (NHESP 14th Edition) dated August 1, 2017, it appears that portions of the Project location are mapped as estimated and priority habitat for rare wildlife/species. If this is the case, the presence of estimated/priority habitat within the Project Area requires that a copy of the NOI and accompanying Plans be sent to NHESP for their review.

If you have any questions regarding these findings and/or you need additional information, please feel free to call me at any time. I am glad I could assist you with this project and let me know if I can be of any help in the future.

Sincerely,
PINEBROOK CONSULTING

Brooke Monroe
Environmental Scientist

Proposal No. 608744-136412



A00860 - 298



PLAN

SCALE: 1" = 20'

TOWN OF PROVINCETOWN
COMPACT NOV. 11, 1620
BIRTHPLACE OF AMERICAN LIBERTY
PRECINCT OF CAPE COD 1714
INCORPORATED 1727

ENVIRONMENTAL PARTNERS

MARK	DATE	DESCRIPTION

Scale	AS SHOWN
Date	AUGUST 2020
Job No.	115-2005
Designed by	
Drawn by	SLC
Checked by	
Approved by	

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

COURT STREET FLOODING MITIGATION
PROVINCETOWN, MA

COURT STREET
EXISTING CONDITIONS I

NOT FOR CONSTRUCTION

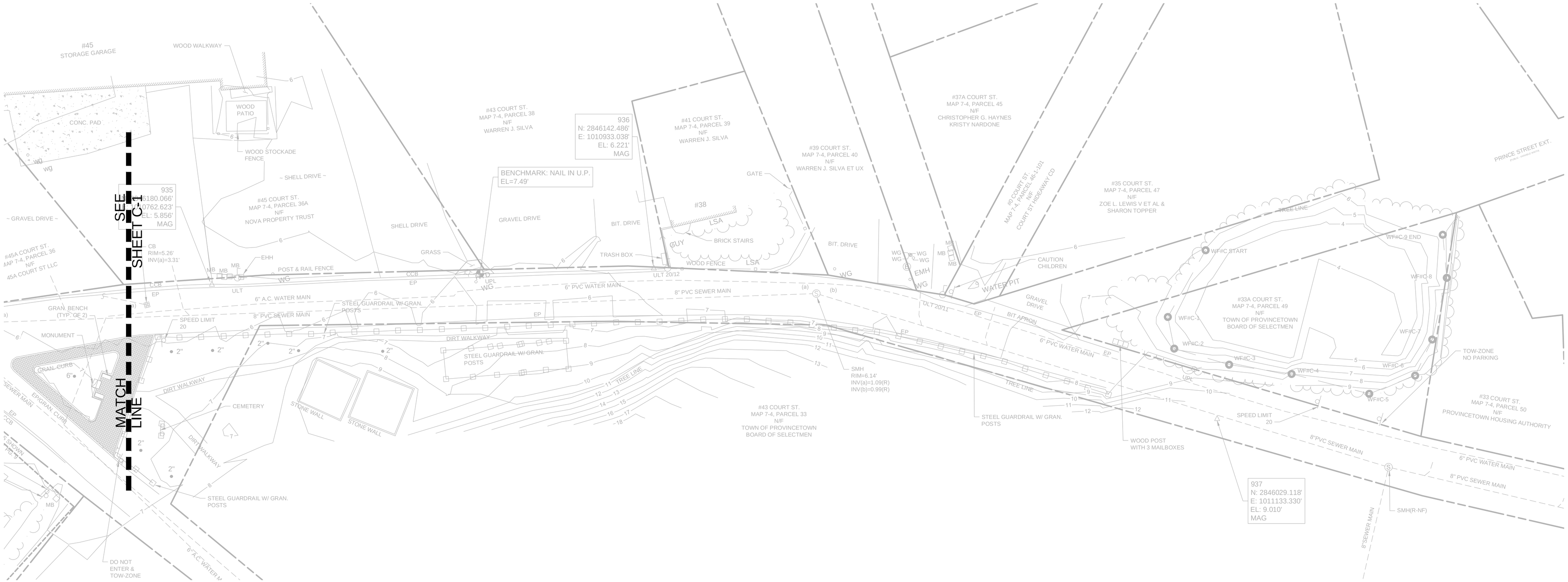
Sheet No.

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Proposal No. 608744-136412

Drawing file: C:\Users\slc\appdata\local\temp\AcPublish_3152\Existing Conditions.dwg Plot Date: Aug 19,2020-10:21am



PLAN
SCALE: 1" = 20'

TOWN OF PROVINCETOWN
COMPACT NOV. 11, 1620
BIRTHPLACE OF AMERICAN LIBERTY
PRECINCT OF CAPE COD 1714
INCORPORATED 1727

ENVIRONMENTAL PARTNERS

MARK	DATE	DESCRIPTION

Scale	AS SHOWN
Date	AUGUST 2020
Job No.	115-2005
Designed by	
Drawn by	SLC
Checked by	
Approved by	

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

COURT STREET FLOODING MITIGATION
PROVINCETOWN, MA

COURT STREET
EXISTING CONDITIONS II

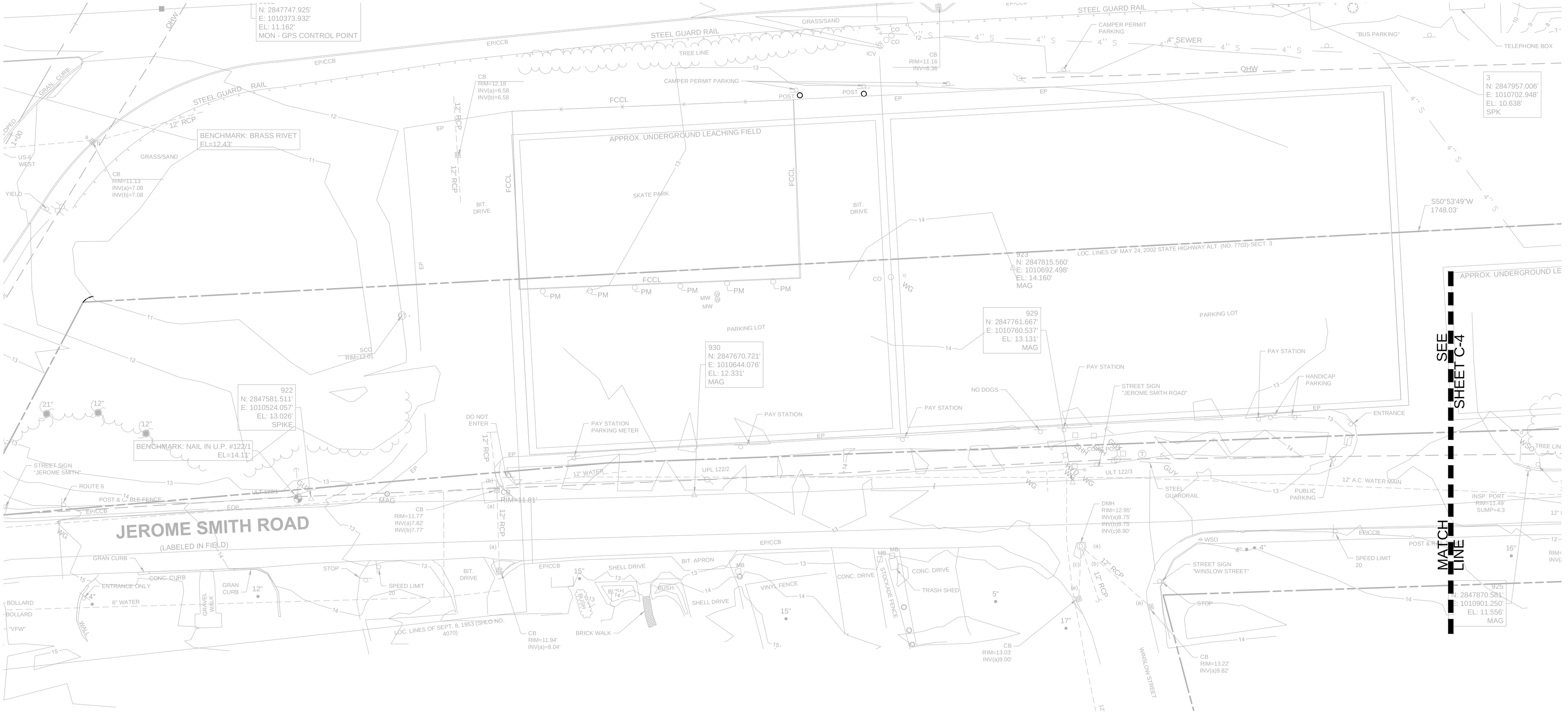
NOT FOR CONSTRUCTION

Sheet No.
C-2

A080860 - 300

Proposal No. 608744-136412

Drawing file: C:\Users\slc\appdata\local\temp\AcPublish_3152\Existing Conditions.dwg Plot Date: Aug 19,2020-10:21am



PLAN
SCALE: 1" = 20'

			Scale	AS SHOWN
			Date	AUGUST 2020
			Job No.	115-2005
			Designed by	
			Drawn by	SLC
			Checked by	
MARK	DATE	DESCRIPTION	Approved by	

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

ENVIRONMENTAL PARTNERS

TOWN OF PROVINCETOWN — COMPACT NOV. 11, 1620 — BIRTHPLACE OF AMERICAN LIBERTY — PRECINCT OF CAPE COD — INCORPORATED 1714

COURT STREET FLOODING MITIGATION
PROVINCETOWN, MA

JEROME SMITH ROAD
EXISTING CONDITIONS I

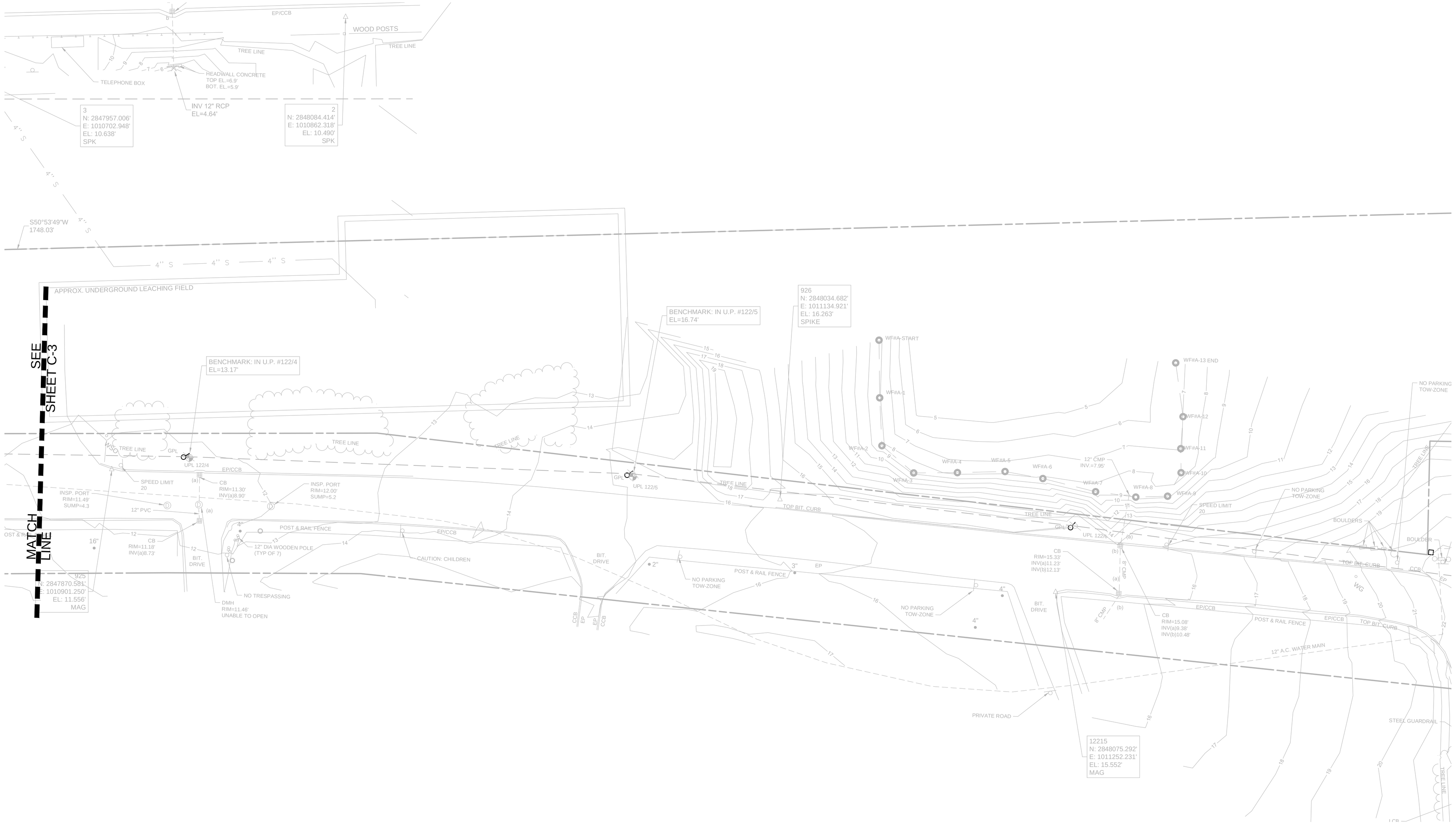
NOT FOR CONSTRUCTION

Sheet No.
C-3

A00860 - 101

Proposal No. 6087441364I2

Drawing file: C:\Users\slc\appdata\local\temp\AcPublish_3152\Existing Conditions.dwg Plot Date: Aug 19,2020-10:21am



PLAN

SCALE: ##########

MARK	DATE	DESCRIPTION

Scale	AS SHOWN
Date	AUGUST 2020
Job No.	115-2005
Designed by	
Drawn by	SLC
Checked by	
Approved by	

THIS LINE IS ONE INCH LONG WHEN PLOTTED AT FULL SCALE ON A 22" X 34" DRAWING

ENVIRONMENTAL PARTNERS

COURT STREET FLOODING MITIGATION
PROVINCETOWN, MA

JEROME SMITH ROAD
EXISTING CONDITIONS II

NOT FOR CONSTRUCTION

Sheet No.

C-4

A00860 - 302

Proposal No. 608744-136412

Drawing file: C:\Users\slc\appdata\local\temp\AcPublish_3152\Existing Conditions.dwg Plot Date: Aug 19,2020 10:21am

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-1**
Location: See Plan
Approx. Ground Elev: NA
Approx. Groundwater Elev: NA
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	S1	5	24/19	Black roadway fill	Fill	1
2		4 2 3		Brown, fine SAND, dry		
3					Fine SAND	
4						
5						
6	S2	6	24/11	Brown, medium SAND, wet	Medium SAND	
7		3 3 1				
8						
9						
10						
11	S3	6	24/7	No recovery in 2" split spoon, used 3" spoon		
12		6 7 10		Tan, medium SAND, wet		
13						
14						
15						
16	S4	3	24/0	No recovery in 2" or 3" split spoons		
17		35 90 88				
18						
19						
20						

NOTES:

1 Groundwater measured at 3' below ground in augers.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

ENVIRONMENTAL PARTNERS

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-1**
Location: See Plan
Approx. Ground Elev: NA
Approx. Groundwater Elev: NA
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
21	S5	8 15 49 90	24/24	Brown, medium to coarse SAND with trace gravel, wet	Medium SAND	
22						
23					Coarse SAND	
24						
25						
26	S6	6 12 20 24	24/12	Brown, coarse SAND and gravel, wet		
27						

Boring terminated at predetermined depth of 27' below grade

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-2**
Location: See Plan
Approx. Ground Elev: NA
Approx. Groundwater Elev: NA
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	S1	7 11 9 11	24/24	Brown, fine to medium SAND, dry	Fine SAND	
2						
3						1
4						
5						
6	S2	4 2 2 2	24/16	Brown, medium SAND, wet		
7						
8						
9						
10						
11	S3	1 2 2 3	24/8	No recovery in 2" split spoon, used 3" spoon Brown, medium SAND, wet	Medium SAND	
12						
13						
14						
15						
16	S4	1 2 6 8	24/0	No recovery in 2" or 3" split spoons		
17						
18						
19						
20						

NOTES:

1 Groundwater measured at 3' below ground in augers.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Court Street Flood Mitigation
Location: Court St, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/4/2020
Checked By:

Boring Locus Map

Boring: **B-2**
Location: See Plan
Approx. Ground Elev: NA
Approx. Groundwater Elev: NA
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
21	S5	4 8	24/14	Tan, medium SAND, wet	Medium SAND	
22		14 20		Tan, coarse SAND with gravel, wet		
23					Medium to Coarse SAND	
24						
25						
26	S6	10 14	24/17	Tan, medium to coarse SAND with trace gravel, wet		
27		17 21				

Boring terminated at predetermined depth of 27' below grade

NOTES:

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Court Street Flood Mitigation
Location: Jerome Smith Rd, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/3/2020
Checked By:

Boring Locus Map

Boring: **B-3**
Location: See Plan
Approx. Ground Elev: NA
Approx. Groundwater Elev: NA
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1 2	S1	4 4 6 5	24/24	Black, fill material	Fill	
3 4 5					Fine SAND	
6 7	S2	1 1 2 2	24/13	Dark brown to brown, fine SAND, moist		
8 9 10						
11 12	S3	2 2 1 2	24/15	Orange to Brown, medium SAND, moist	Medium SAND	1
13 14 15						
16 17	S4	4 1 17 50	24/18	Brown, medium to fine SAND, wet		

Boring terminated at predetermined depth of 17' below grade

NOTES:

1 Groundwater measured at 12' below ground in augers.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Court Street Flood Mitigation
Location: Jerome Smith Rd, Provincetown
Client: Town of Provincetowm
Driller: Northern Drilling
Drilling Methods: Auger
Weather: Sunny , 70°s
Performed By: SJG Date: 6/3/2020
Checked By:

Boring Locus Map

Boring: **B-4**
Location: See Plan
Approx. Ground Elev: NA
Approx. Groundwater Elev: NA
Datum:
Project No. 115-2005

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	S1	3	24/19	Fill	FILL	
2		6 7 8		Tan, medium SAND, dry		
3						
4						
5						
6	S2	1 2 3	24/18	Tan, medium SAND, dry		
7		2				
8					Medium SAND	
9						
10						
11	S3	1 0	24/14	Tan, medium SAND, dry to wet		1
12		1 0				
13						
14						
15						
16	S4	2 3	24/9	Tan, medium SAND, wet		
17		4 25				

Boring terminated at predetermined depth of 17' below grade

NOTES:

1 Groundwater measured at 10.5' below grade in augers.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

ATTACHMENT 2

Storage Analysis Figure

Duck Pond
2-Year Storm Storage Volume = 4.99 MG
10-Year Storm Storage Volume = 4.74 MG
Max Storage EL. = 5.6'
Water Surface EL. = 4'
Pond Bottom EL. = 3.51'

Leaching Basins

Jerome Smith Storage Area
2-Year Storage Volume = 0.60 MG
10-Year Storage Volume = 0.57 MG
Max Storage EL. = 11.55'
Water Surface EL. = 8'
Pond Bottom EL. = 3.68'

Shank Painter Storage Area
2-Year Storm Storage Volume = 0.06 MG
10-Year Storm Storage Volume = 0.06 MG
Max Storage EL. = 7'
Water Surface EL. = 5'
Pond Bottom EL. = 3.38'

Route 6 Drainage Area

Court Street Flooding Area
Street Low Point EL. = 5.26'

2-Year, 24-Hour Storm
0.61 MG
EL. = 6.85'

Underground Storage Area
Storage Volume = .40 MG
Length = 100'
Width = 60'
Depth = 10'

10-Year, 24-Hour Storm
0.98 MG
EL. = 7.17'

Shank Painter Pond
Max Storage El. = 6.5'
Water Surface EL. = 6'
Rise from Court St. 2-yr Storm = 1/5"
Rise from Court St. 10-yr Storm = 1/3"

I:\Provincetown.115\Stormwater\115-2005 Court St Flood Mitigation\80 Basis of Design Docs\01 Prelim Design Memo\Figures\GIS\Figure 1 - Subcatchments and Hydraulic Features.mxd

ENVIRONMENTAL PARTNERS

1 in = 300 feet	COURT STREET FLOODING MITIGATION PROVINCETOWN, MA	FIGURE
December 2020	EXISTING CONDITIONS SUBCATCHMENTS AND STORAGE AREAS	
Job #: 115-2005		

ATTACHMENT 3
Schematic Design

Reuse existing outfall

Limits of
Duck Pond Storage

Duck Pond
2-Year Storm Storage Volume = 4.99 MG
10-Year Storm Storage Volume = 4.74 MG
Max Storage EL. = 5.6'
Water Surface EL. = 4'
Pond Bottom EL. = 3.51'

450' of gravity pipe
to Duck Pond

Wastewater Effluent
Leaching Fields

Infiltration Basin
Joins with local drainage

Shank Painter Storage
with Incoming Flow from
Shank Painter Road

1700' of 16" Dia. FM
from Court St. Pump Station
to infiltration basin

Court Street Flooding Area
Pond Bottom = 5.26'

Drainage System with
TSS Removal Treatment

Shank Painter Storage Area
Storage Volume = 0.06 MG
Max Storage EL. = 7'
Water Surface EL. = 5'
Pond Bottom EL. = 3.38

Proposed Court Street
Submersible Pump Station
and Wet Well

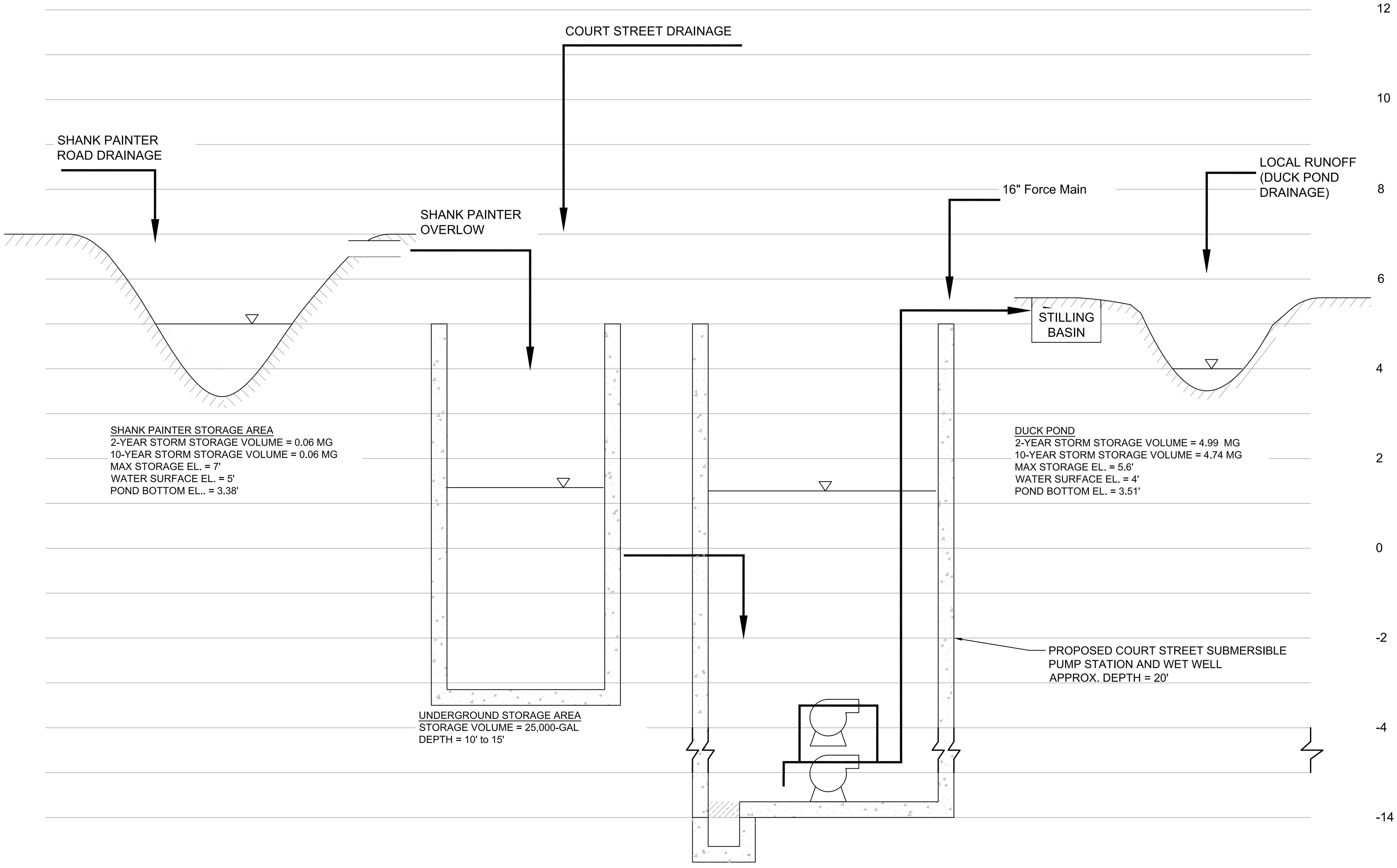
Legend

- Catch Basin
- Manhole

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ENVIRONMENTAL PARTNERS

1 in = 300 feet	COURT STREET FLOODING MITIGATION PROVINCETOWN, MA	FIGURE
December 2020	PROPOSED PUMPED FLOW TO DUCK POND STORAGE OVERVIEW	
Job #: 115-2005		



ENVIRONMENTAL PARTNERS

FEBRUARY 2021	COURT STREET FLOODING MITIGATION PROVINCETOWN, MA
JOB #: 115-2005	
NTS	ALTERNATIVE 1 - SCHEMATIC FLOW DIAGRAM

I:\PROVINCETOWN.115\STORMWATER\115-2005 COURT ST FLOOD MITIGATION\80 BASIS OF DESIGN DOCS\01 PRELIM DESIGN MEMO\FIGURES\CAD\FIGURE 3 - FLOW DIAGRAM.REV.DWG

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Proposal No. 6087A4-135412

APPENDIX 4

Opinion of Probable Construction Costs

ENVIRONMENTAL PARTNERS

Preliminary Engineer's Opinion of Probable Construction Costs
Court Street Flood Mitigation
Provincetown, MA
2/17/2021

Item Number	Item Description	Units	Unit Price ($)	Alternative 1: Pump to Duck Pond		Alternative 2: On-site Underground Storage Combined with Pumping to Jerome Smith Storage		Alternative 3: Pump to Shank Painter Pond via Stop & Shop Parking Lot		Alternative 4: Pump to Jerome Smith Storage with Temporary Flooding	
				Total Est. Quantity	Extended Amt. ($)	Total Est. Quantity	Extended Amt. ($)	Total Est. Quantity	Extended Amt. ($)	Total Est. Quantity	Extended Amt. ($)
1	Mob / demob (5% of Items 2-9)	EA		1	$ 114,000	1	$ 195,000	1	$ 94,000	1	$ 110,000
2	Local Drainage - CB's, MH's, Shank Painter Storage Modifications, Treatment, Piping	LS		1	$ 261,000	1	$ 261,000	1	$ 261,000	1	$ 261,000
3	Pump Station (4,000-gpm)	LS		1	$ 1,210,000	1	$ 1,210,000	1	$ 1,210,000	1	$ 1,210,000
4	Pump Station Wet Well	Gal	$ 4	25,000	$ 100,000	450,000	$ 1,800,000	25,000	$ 100,000	25,000	$ 100,000
5	Generator and Fuel Storage	LS	$ 100,000	1	$ 100,000	1	$ 100,000	1	$ 100,000	1	$ 100,000
6	16" Dia. Force Main	LF	$ 200	1,700	$ 340,000	2,350	$ 470,000	700	$ 140,000	2,350	$ 470,000
7	24" Gravity Piping	LF	$ 200	600	$ 120,000	0	$ -	0	$ -	0	$ -
8	Stilling Basin (Impact Basin)	LS	$ 20,000	1	$ 20,000	1	$ 20,000	1	$ 20,000	1	$ 20,000
9	Paving	SY	$ 40	3,300	$ 132,000	1,200	$ 48,000	1,200	$ 48,000	1,200	$ 48,000
				Construction Subtotal	$ 2,397,000	**Construction Subtotal**	$ 4,104,000	**Construction Subtotal**	$ 1,773,000	**Construction Subtotal**	$ 2,119,000
				25% Construction Contingency	$ 599,000	**25% Construction Contingency**	$ 1,026,000	**25% Construction Contingency**	$ 443,000	**25% Construction Contingency**	$ 530,000
				20% Engineer Services	$ 599,000	**20% Engineer Services**	$ 1,026,000	**20% Engineer Services**	$ 443,000	**20% Engineer Services**	$ 530,000
				Construction Total	$ 3,595,000	Construction Total	$ 6,156,000	Construction Total	$ 2,659,000	Construction Total	$ 3,179,000

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Proposal No. 608744-136412

ATTACHMENT 2.1

Design Parameters

Shank Painter Road and Route 6 Reconstruction

Attachment 2.1

Model Setup

EP used PCSWMM Version 7.5 for hydrologic and hydraulic stormwater modeling to model existing and proposed conditions within the project area. PCSWMM uses the Environmental Protection Agency's (EPA) Stormwater Management Model (SWMM) as the primary model engine.

EP gathered data from the following sources for input into the stormwater model:

- Drainage System – Topographic and utility information was gathered from field investigations, Town records, and survey investigation.
- Elevations – Digital elevation model (DEM) data were downloaded from the MassGIS website at https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html. The DEM file was used for sub-catchment delineation within the catchment (study) area. Drainage system rim and invert elevation data were gathered from field investigations in the extent of the surveyed area. For structures outside of the surveyed area, a combination of Town records and DEM data was used for estimating the rims and inverts.
- Soils – Soil information (For CN Values and infiltration) was gathered from the United States Geological Survey (USGS) Web Soil Survey (WSS) website https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. The WSS provides soil data for stormwater analysis, such as soil types, hydraulic soil groups (HSG), and estimated infiltration rates.
- Land Use (for CN Values) area was developed from shape files downloaded from the MassGIS website at https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html. The areas were confirmed by using aerial views from ortho imagery.
- Rainfall Events – Data for the 2-yr, 10-yr, and 100-yr 24-hr rainfall events were gathered from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 10, Version 3 website as shown in Table 1. Type III Soil Conservation Services (SCS) unit hydrograph was selected to develop the rainfall distribution

Table 1 – Rainfall Events[1]

Frequency	Total Rainfall (in)
2-year, 24-hour	3.14
10-year, 24-hour	4.60
100-year, 24-hour	6.92

1. https://hdsc.nws.noaa.gov/hdsc/pfds/

Attachment 3.1 and 3.2, shows the watershed delineation. The watershed delineation area hydrology and hydraulics were analyzed within the model. EP developed a curve number (CN) for each subcatchment using land use and soils information. Time of concentration values were estimated for all subcatchments. A minimum time of concentration value of 5 minutes was used for smaller subcatchments. Subcatchment runoff was directed directly to drainage infrastructure in

areas with drainage infrastructure. In areas without drainage infrastructure, subcatchment flow was directed to a node on the 2D surface.

The model's hydraulic features consist of the following:

- Drainage structures (junctions), pipes (conduits), outfalls, and storages for modeling wetlands and ponds
- The existing infiltration structures on Shank Painter Road were unable to be opened for inspection. We assumed the structures are all 6-ft diameter, 5-ft deep dry wells.
- Vertical Datum is NAVD1988.

EP made the following assumptions during the creation of the model:

- Sub-catchment delineations were based on the DEM contour elevations.
- EP assumed soils within the area were similar to the USGS Web Soil Survey website soil data.
- Shank Painter Pond was not modeled. The flood zone for Shank Painter Pond extents over parts of Shank Painter Road and Court Street. The 100-year modeled storms to not include the effects of the Shank Painter Pond flooding.
- All outfalls have free discharge.

EP created a 2D network to model flood extents around Shank Painter Road. Refer to Figures 1 and 2 below for an overview of the extent of the 2D network. The 2D network includes Duck Pond and the surrounding wetland areas, Route 6 at the intersection of Shank Painter, the entirety of Shank Painter Road, Court Street, Winthrop Street, Bradford Street at the intersection of Shank Painter, and the wetland area in the South Shank Painter drainage area. The 2D network consists of the following features:

- A hexagonal array of junctions and conduits, with all elevations taken from LiDAR data.
- The conduit roughness values are based on land use surface types.
- The 2D surface and 1D drainage network are connected by orifices or direct connection. For drainage structures, a 2-ft by 2-ft bottom orifice at the elevation of a structures rim connects the structure to the 2D network, representing a catch basin grate opening. Outfalls within the 2D network are directly connected to the 2D surface.
- Wetland areas are connected to the 2D network with direct connection. The 2D network over the wetland areas have a minimum elevation equal to the top of the storages. Flow only leaves the storage and enters the 2D network if the storage water level is exceeded. Flow from the 2D network can go directly into the storages.
    - For example. Duck Pond storage models water elevations from elevation 4' to elevation 5'. Above 5', water enters the 2D surface. The 2D nodes in the Duck Pond area and surrounding wetlands were raised to a minimum elevation of 5' to avoid double counting storage.
- The extents of the 2D network include Duck Pond and the surrounding wetland areas, Route 6 at the intersection of Shank Painter, the entirety of Shank Painter Road, Court Street, Winthrop Street, Bradford Street at the intersection of Shank Painter, and the wetland area in the South Shank Painter drainage area.

- The edges of the 2D surface are bordered with 2D outfalls to allow water to leave the 2D model at low points, instead of artificially accumulating in an area.

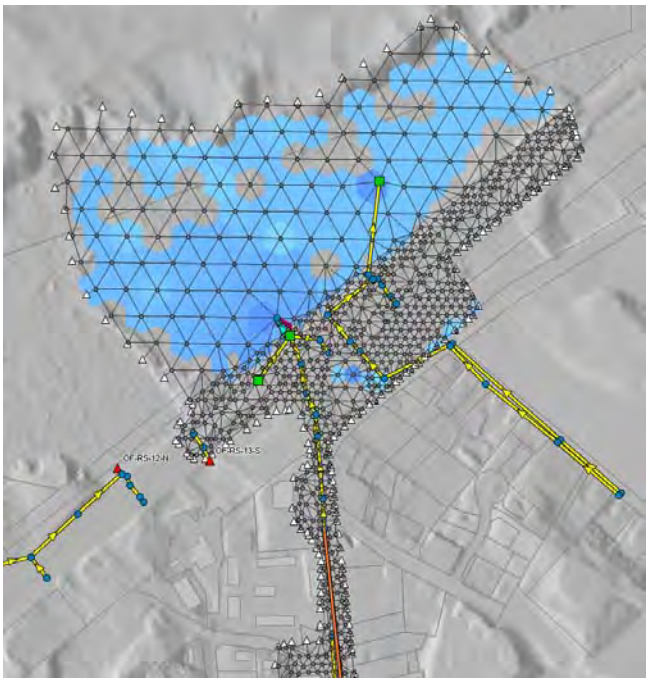


Figure 1 - 2D Network limits, North

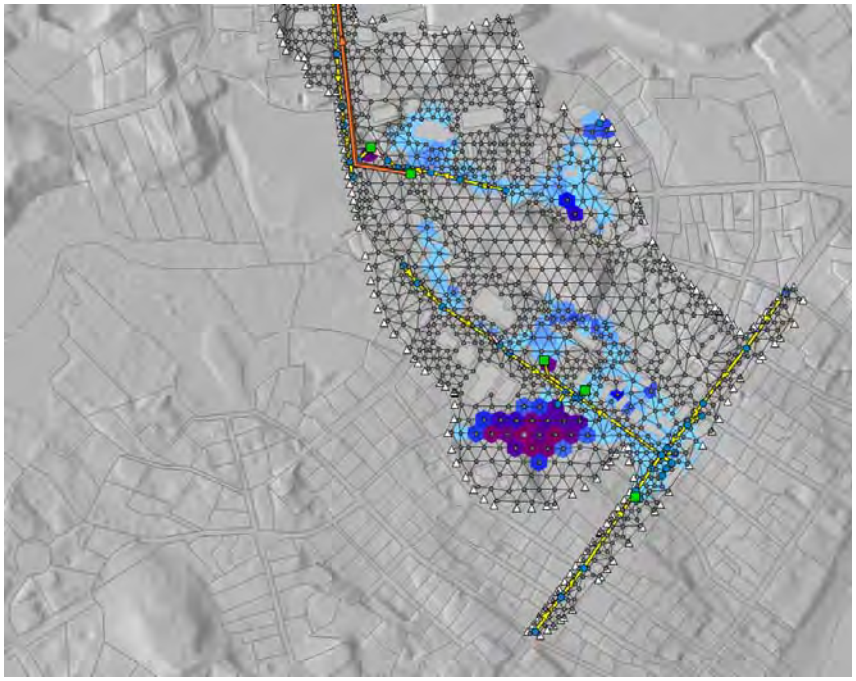
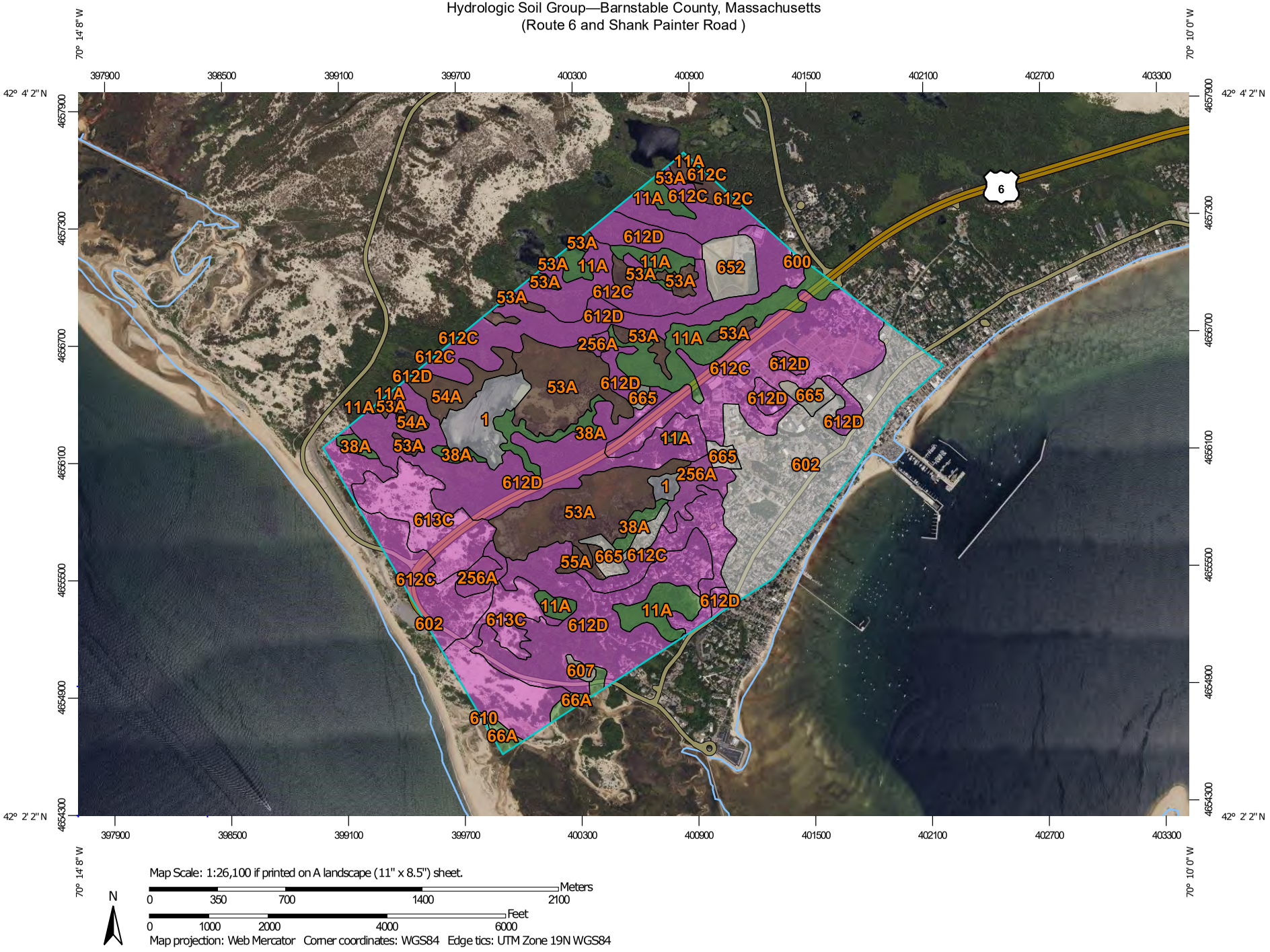


Figure 2 - 2D Network Limits, South

ATTACHMENT 2.2

Soils Data from NRCS

Hydrologic Soil Group—Barnstable County, Massachusetts
(Route 6 and Shank Painter Road)



Map Scale: 1:26,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 20, Sep 12, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 10, 2022—Jun 30, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

A00860 - 330

Proposal No. 608744-136412

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		31.9	2.6%
11A	Berryland mucky loamy coarse sand, 0 to 2 percent slopes	A/D	91.3	7.4%
38A	Pipestone loamy coarse sand, 0 to 3 percent slopes	A/D	25.1	2.0%
53A	Freetown muck, ponded, coastal lowland, 0 to 1 percent slopes	B/D	145.4	11.7%
54A	Freetown and Swansea mucks, coastal lowland, 0 to 1 percent slopes	B/D	21.4	1.7%
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	B/D	4.9	0.4%
66A	Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded	A/D	9.5	0.8%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	23.8	1.9%
600	Pits, sand and gravel		1.0	0.1%
602	Urban land		143.2	11.5%
607	Water, saline		3.0	0.2%
610	Beaches, sand		0.4	0.0%
612C	Hooksan sand, 3 to 15 percent slopes	A	266.2	21.4%
612D	Hooksan sand, 15 to 35 percent slopes	A	326.5	26.3%
613C	Hooksan-Dune land complex, 15 to 35 percent slopes	A	103.4	8.3%
652	Dumps, landfill		19.9	1.6%
665	Udipsamments, smoothed		25.5	2.1%
Totals for Area of Interest			**1,242.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ATTACHMENT 2.3

Rainfall Data from NOAA

NOAA Atlas 14, Volume 10, Version 3
Location name: Provincetown, Massachusetts, USA*
Latitude: 42.0504°, Longitude: -70.1952°
Elevation: 10 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.268** (0.215-0.328)	**0.338** (0.271-0.415)	**0.452** (0.362-0.557)	**0.547** (0.435-0.678)	**0.678** (0.520-0.882)	**0.775** (0.582-1.03)	**0.880** (0.641-1.22)	**1.00** (0.683-1.41)	**1.19** (0.776-1.73)	**1.35** (0.857-2.00)
10-min	**0.379** (0.305-0.465)	**0.479** (0.384-0.587)	**0.642** (0.512-0.790)	**0.776** (0.617-0.961)	**0.961** (0.736-1.25)	**1.10** (0.824-1.46)	**1.25** (0.907-1.73)	**1.42** (0.966-1.99)	**1.69** (1.10-2.45)	**1.92** (1.22-2.83)
15-min	**0.446** (0.359-0.547)	**0.563** (0.452-0.691)	**0.754** (0.603-0.928)	**0.912** (0.724-1.13)	**1.13** (0.866-1.47)	**1.29** (0.969-1.72)	**1.47** (1.07-2.03)	**1.68** (1.14-2.35)	**1.99** (1.29-2.88)	**2.26** (1.43-3.33)
30-min	**0.646** (0.519-0.792)	**0.811** (0.651-0.996)	**1.08** (0.865-1.33)	**1.31** (1.04-1.62)	**1.62** (1.24-2.10)	**1.84** (1.39-2.46)	**2.09** (1.53-2.91)	**2.39** (1.62-3.35)	**2.85** (1.85-4.14)	**3.25** (2.06-4.80)
60-min	**0.845** (0.679-1.04)	**1.06** (0.851-1.30)	**1.41** (1.13-1.74)	**1.70** (1.35-2.11)	**2.10** (1.61-2.74)	**2.40** (1.80-3.20)	**2.72** (1.99-3.78)	**3.11** (2.11-4.36)	**3.72** (2.42-5.39)	**4.24** (2.68-6.26)
2-hr	**1.14** (0.921-1.38)	**1.42** (1.15-1.74)	**1.90** (1.53-2.32)	**2.29** (1.83-2.81)	**2.83** (2.19-3.64)	**3.22** (2.44-4.25)	**3.66** (2.69-5.02)	**4.18** (2.86-5.78)	**4.97** (3.26-7.10)	**5.65** (3.61-8.22)
3-hr	**1.34** (1.09-1.62)	**1.67** (1.36-2.02)	**2.21** (1.79-2.69)	**2.66** (2.14-3.26)	**3.28** (2.55-4.20)	**3.74** (2.85-4.90)	**4.24** (3.13-5.76)	**4.83** (3.33-6.63)	**5.72** (3.78-8.11)	**6.48** (4.17-9.35)
6-hr	**1.73** (1.42-2.08)	**2.13** (1.75-2.56)	**2.78** (2.27-3.36)	**3.32** (2.70-4.03)	**4.07** (3.19-5.15)	**4.62** (3.54-5.97)	**5.21** (3.88-6.98)	**5.90** (4.11-8.00)	**6.92** (4.62-9.67)	**7.77** (5.06-11.1)
12-hr	**2.19** (1.81-2.61)	**2.64** (2.18-3.15)	**3.37** (2.77-4.03)	**3.97** (3.25-4.78)	**4.81** (3.80-6.01)	**5.44** (4.20-6.92)	**6.10** (4.56-8.02)	**6.84** (4.82-9.15)	**7.91** (5.35-10.9)	**8.79** (5.79-12.3)
24-hr	**2.65** (2.21-3.13)	**3.14** (2.61-3.72)	**3.94** (3.27-4.68)	**4.60** (3.79-5.49)	**5.51** (4.39-6.81)	**6.20** (4.83-7.79)	**6.92** (5.21-8.96)	**7.70** (5.50-10.2)	**8.81** (6.03-12.0)	**9.69** (6.46-13.4)
2-day	**3.08** (2.59-3.62)	**3.61** (3.04-4.25)	**4.48** (3.75-5.28)	**5.19** (4.32-6.15)	**6.18** (4.96-7.55)	**6.93** (5.44-8.60)	**7.70** (5.84-9.83)	**8.53** (6.16-11.1)	**9.69** (6.71-13.0)	**10.6** (7.15-14.4)
3-day	**3.39** (2.86-3.96)	**3.93** (3.32-4.60)	**4.81** (4.05-5.64)	**5.54** (4.64-6.53)	**6.55** (5.29-7.96)	**7.32** (5.78-9.03)	**8.10** (6.19-10.3)	**8.95** (6.50-11.6)	**10.1** (7.06-13.4)	**11.1** (7.51-14.9)
4-day	**3.64** (3.09-4.25)	**4.19** (3.55-4.89)	**5.08** (4.29-5.94)	**5.82** (4.89-6.83)	**6.84** (5.55-8.27)	**7.61** (6.04-9.35)	**8.41** (6.45-10.6)	**9.26** (6.76-11.9)	**10.4** (7.32-13.8)	**11.4** (7.77-15.3)
7-day	**4.31** (3.68-4.99)	**4.87** (4.16-5.64)	**5.79** (4.92-6.72)	**6.55** (5.54-7.64)	**7.60** (6.21-9.10)	**8.40** (6.71-10.2)	**9.22** (7.11-11.5)	**10.1** (7.41-12.8)	**11.2** (7.93-14.6)	**12.1** (8.33-16.0)
10-day	**4.91** (4.22-5.66)	**5.50** (4.71-6.35)	**6.46** (5.52-7.47)	**7.26** (6.16-8.42)	**8.35** (6.85-9.94)	**9.20** (7.37-11.1)	**10.0** (7.77-12.4)	**10.9** (8.08-13.8)	**12.0** (8.56-15.6)	**12.9** (8.93-16.9)
20-day	**6.67** (5.78-7.63)	**7.36** (6.36-8.43)	**8.49** (7.31-9.74)	**9.42** (8.07-10.8)	**10.7** (8.86-12.6)	**11.7** (9.46-13.9)	**12.7** (9.88-15.4)	**13.6** (10.2-17.0)	**14.8** (10.7-18.9)	**15.6** (11.0-20.2)
30-day	**8.13** (7.08-9.26)	**8.91** (7.74-10.2)	**10.2** (8.83-11.6)	**11.2** (9.69-12.9)	**12.7** (10.6-14.8)	**13.9** (11.2-16.4)	**15.0** (11.7-17.9)	**16.0** (12.1-19.7)	**17.2** (12.5-21.7)	**18.0** (12.8-23.1)
45-day	**9.96** (8.71-11.3)	**10.9** (9.48-12.3)	**12.3** (10.7-14.0)	**13.5** (11.7-15.4)	**15.2** (12.7-17.6)	**16.5** (13.5-19.4)	**17.8** (14.0-21.1)	**18.9** (14.4-23.1)	**20.2** (14.8-25.2)	**21.0** (15.0-26.7)
60-day	**11.5** (10.1-13.0)	**12.5** (11.0-14.1)	**14.1** (12.3-16.0)	**15.4** (13.4-17.5)	**17.3** (14.5-20.0)	**18.8** (15.4-21.8)	**20.1** (15.9-23.7)	**21.3** (16.3-25.9)	**22.6** (16.7-28.2)	**23.5** (16.8-29.6)

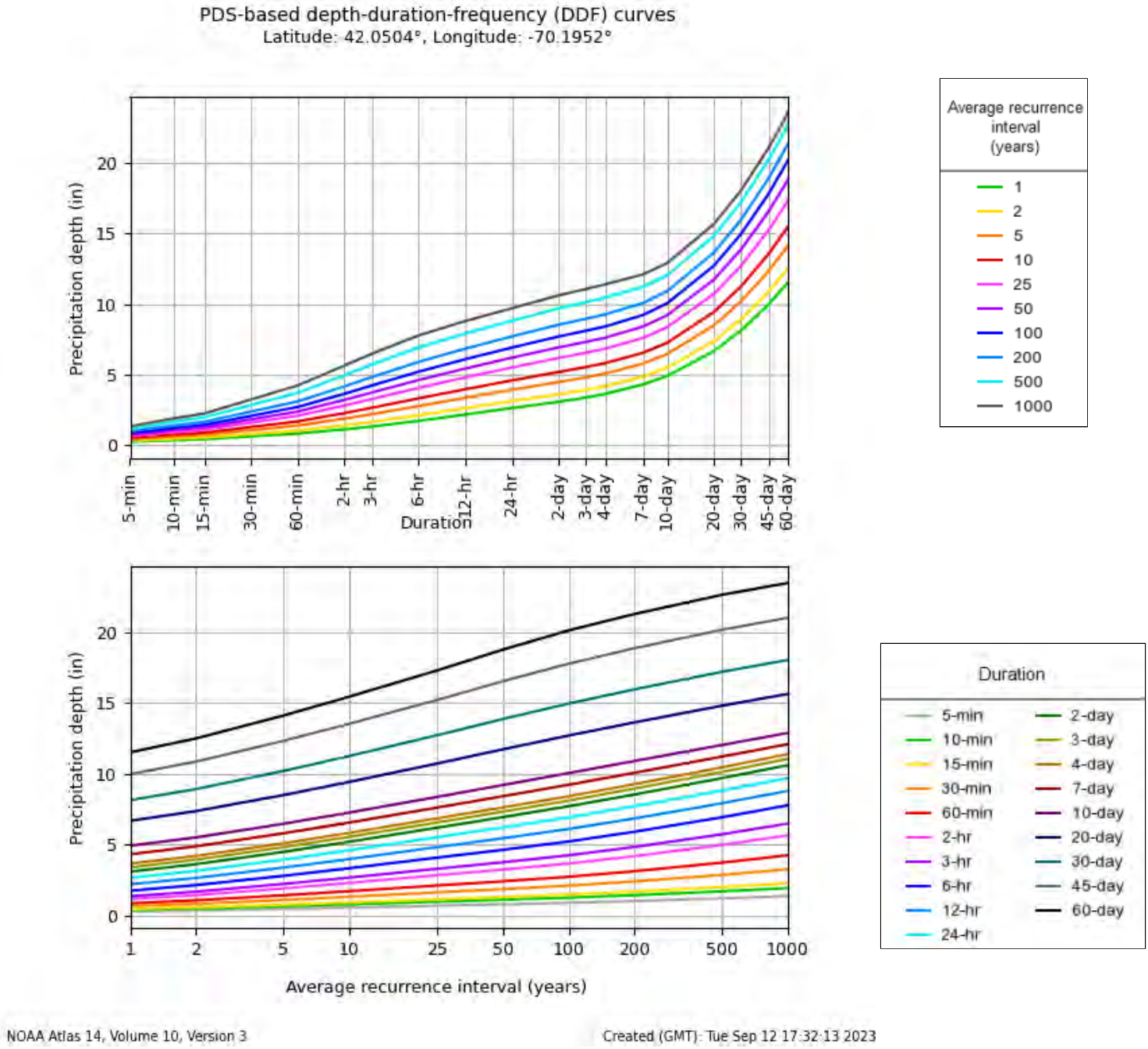
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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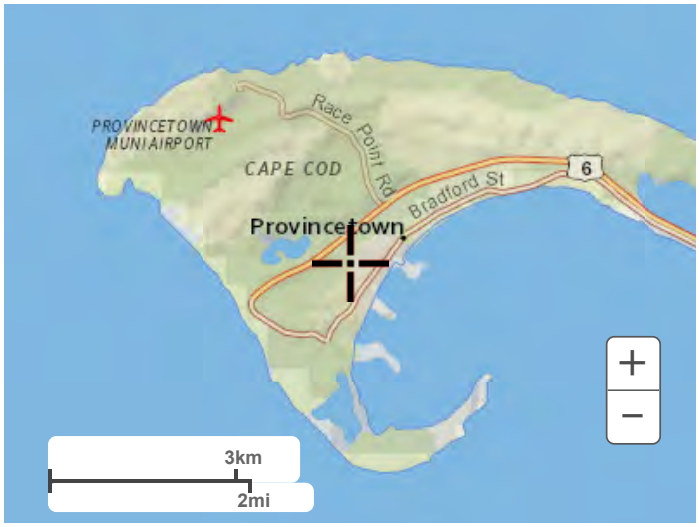
PF graphical



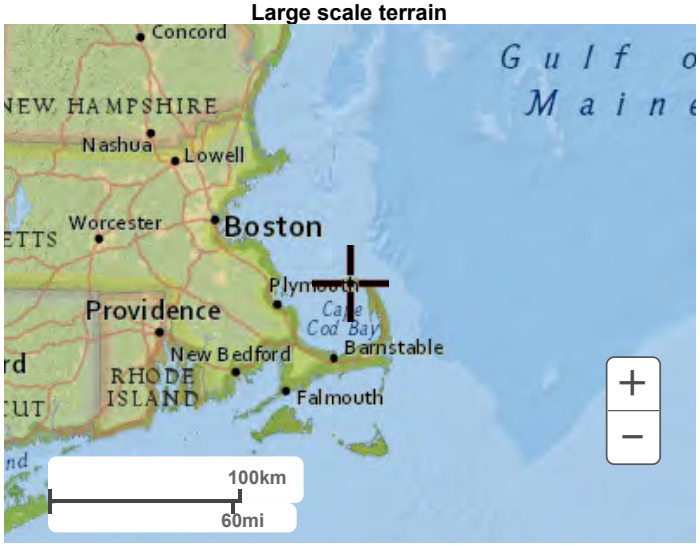
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Maps & aerials

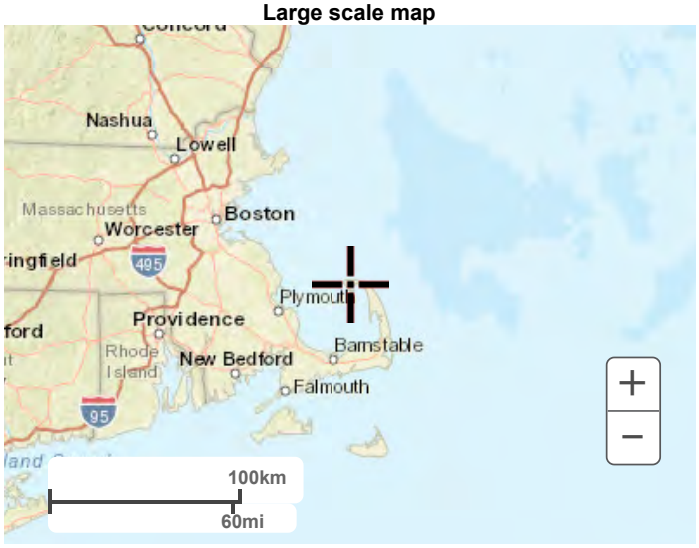
Small scale terrain



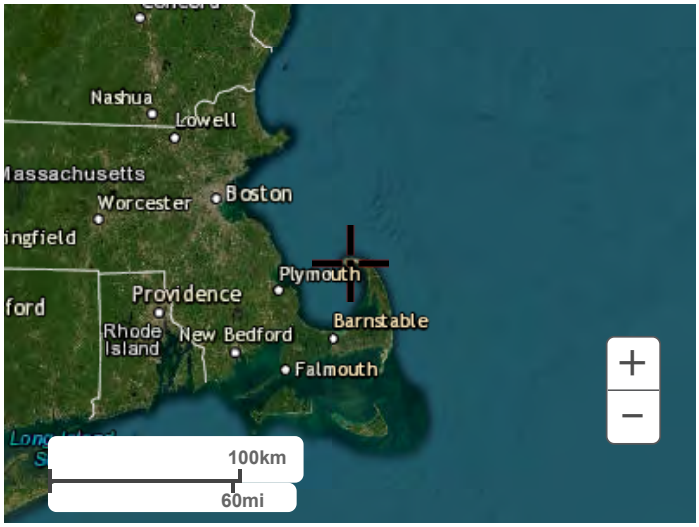
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

ATTACHMENT 2.4

Existing Land Use Figure

MassGIS Existing Land Use
- Bare Land
- Deciduous Forest
- Developed Open Space
- Evergreen Forest
- Grassland
- Impervious
- Wetlands
- Scrub/Shrub
- Unconsolidated Shore
- Water

N

Attachment 2.4

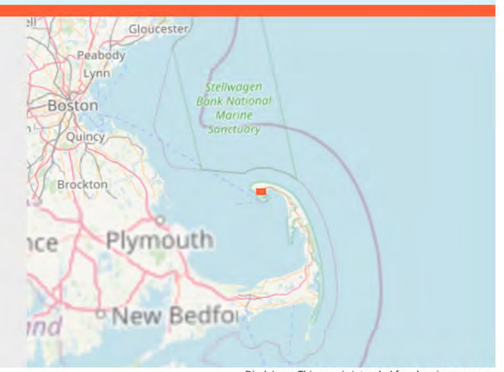
Existing Land Use

Provincetown, MA

3/22/2024

0 500 1,000 2,000 Feet

ENVIRONMENTAL PARTNERS
— An Apex Company —



E:\Provincetown.T151115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\2.3 Existing Land Use Figure\Existing Subcatchments Figure

Disclaimer: This map is intended for planning purposes

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Proposal No. 60874+136412

ATTACHMENT 2.5

Geotechnical Borings

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 79F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-1
Location: Gravel Lot near #15 SP Rd.
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 5.13' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					1
2						
3						
4						
5	S-1	9 7 3 5	24/7	3" Wood 4" Coarse Sand with Trace Gravel	Wood Coarse Sand with Trace Gravel	2
6						
7						
8						
9						
10	S-2	6 5 3 3	24/24	18" Coarse Sand 3" Wood 3" Medium Gravel and Sand	Coarse Sand Wood Medium Gravel and Sand	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Wood from around 1.5'-3' below grade.
2. Approximate GW elev. = 5.13' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 80F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-2
Location: Parking Lot Near Fire Station
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 6.25' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4						
5	S-1	6 5 7 7	24/17	5" Sand with Some Medium Gravel 12" Coarse Sand	Sand with Some Med. Gravel Coarse Sand	1
6						
7						
8						
9						
10	S-2	5 5 5 4	24/21	21" Coarse Sand with Trace Gravel	Coarse Sand with Trace Gravel	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 6.25' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-3
Location: SP Rd and Court St Intersection
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 10.2' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4						
5	S-1	10 4 10 18	24/17	2" Asphalt/Pavement 15" Coarse Sand	Asphalt/Pavement Coarse Sand	
6						
7						
8						
9						
10	S-2	18 9 9 7	24/21	2" Coarse Sand with Little Gravel 19" Coarse Sand	Coarse Sand with Little Gravel Coarse Sand	1
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 10.2' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-4
Location: SP Rd and Court St Intersection
Approx. Ground Elev: Unk.
Approx. Groundwater Elev: 10.7' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4						
5	S-1	5 2 7 14	24/19	19" Coarse Sand	Coarse Sand	
6						
7						
8						
9						
10	S-2	6 7 10 12	24/20	2" Sand with Some Medium Gravel 18" Coarse Sand	Sand with Some Med. Gravel Coarse Sand	1
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 10.7' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

BORING LOG

Project: Shank Painter Road
Location: Shank Painter Rd, Provincetown
Client: Town of Provincetown
Driller: Northern Drilling Services, Inc.
Drilling Methods: Wash and Drive
Weather: 82F, Sunny
Performed By: LKH Date: 9/7/2023
Checked By:

Boring Locus Map

Boring: B-5
Location: SP Rd and Rt. 6 Interseciton
Approx. Ground Elev: 16' bgs
Approx. Groundwater Elev: 11.7' bgs
Datum:
Project No. 115-1601

Depth (feet)	Sample No.	Blows per 6-inch	Pen./ Rec. (inches)	Soil Description	Stratum Depth Change (feet)	Note No.
1	Skipped					
2						
3						
4						
5	S-1	7 10 11 13	24/21	5" Coarse Sand with Trace Silt 16" Coarse Sand	Coarse Sand with Trace Silt Coarse Sand	
6						
7						
8						
9						
10	S-2	6 10 11 9	24/21	21" Coarse Sand	Coarse Sand	
11						
12						1
13						
14						
15	S-3	8 35 47 90+	24/24	23" Coarse Sand 1" Rock	Coarse Sand Rock	2
16						
17						
18						
19						
20						
21						

NOTES:

1. Approximate GW elev. = 11.7' below grade.
2. Approximate Bedrock elev. = 16' below grade.

LEGEND

S - Split Spoon Sample	O/A - Sample Collected Off the Augers
UT - Undisturbed Tube Sample	C - Rock Core
Trace - Approximately 0 to 10%	Some - Approximately 20 to 35%
Little - Approximately 10 to 20%	And - Approximately 35 to 50%
0-4 Coarse Soil N Value - Very Loose	11-30 Coarse Soil N Value - Medium Dense
5-10 Coarse Soil N Value - Loose	31-50 Coarse Soil N Value - Dense
0-2 Fine Soil N Value - Very Soft	4-8 Fine Soil N Value - Medium Stiff
2-4 Fine Soil N Value - Soft	8-15 Fine Soil N Value - Stiff

ATTACHMENT 3.1

Existing Hydrology Map – Subcatchments and Time of Concentration

Existing Tc Paths

Catchment Zones

- 1 - Route 6
- 2 - Duck Pond
- 3 - North Shank Painter
- 4 - Court St
- 5 - South Shank Painter
- 6 - Winthrop Pond

Name	CN	Tc
S30	59.304	7.3
S36	64.068	24.9
S33	67.134	15.1
S49_1	87.78	17.8
S53	78.512	5
S2	54.06	12.8
S28	69.412	7.722
S26_1	80.121	5
S26_2	82.234	9.199
S1	82.955	5.002
S14	74.72	6.698
S52_2	91.184	5.001
R1_1	71.117	5
S28	69.412	7.722
S2	54.06	12.8
R1_1	71.117	5
S28	69.412	7.722
S52_2	91.184	5.001
S26_2	82.234	9.199
S1	82.955	5.002
S25	82.355	13.9
S32	79.692	5.9
S49_3	98	5
S49_4	87.166	5
S23	64.122	5
S14	74.72	6.698
S26	93.496	5
S46_2	42.031	5
S6_4	62.146	5
S6_3	54.929	5
R1_1	71.117	5
S26_2	82.234	9.199
S52_2	91.184	5.001
S46_2	42.031	5
S6_4	62.146	5
S26_2	82.234	9.199

Name	CN	Tc
S14	74.72	6.698
S26	93.496	5
S49_2	81.972	5
S49_5	97.821	5
S49_6	88.899	5
S46_2	42.031	5
S12	54.548	6.7
S6_3	54.929	5
S61_1	90.906	13.898
S106	98	5.041
S112	92.078	5
S106	98	5.041
S76_1	70.914	7.6
S2_3	76.097	9.5
R3_4	77.569	5.001
R3_4	77.569	5.001
S76_1	70.914	7.6
S98_3	90.344	5
S2_1	55.211	5
S76_1	70.914	7.6
S2_3	76.097	9.5
S49_8	94.296	5
S70_2	81.003	5
S80_1	92.473	5
S106	98	5.041
S112	92.078	5
S119	88.363	5
S122	98	5
S123_1	92.274	5
S128_4	98	5
S128_3	98	5
S13	71.254	10.3
S5	82.903	5
S128_1	96.656	5.001
S141	92.649	5.001
S13	71.254	10.3

Name	CN	Tc
S5	82.903	5
R3_3	88.01	5
R3_3	92.689	5
S11	97.442	5
S13	71.254	10.3
S128_1	96.656	5.001
S13	71.254	10.3
S141	92.649	5.001
S7	97.919	5
S9	97.656	5
S7	97.919	5
S9	97.656	5
S6_1	45.842	5.2
S12	54.548	6.7
S6_3	54.929	5
S6_1	45.842	5.2
S12	54.548	6.7
S75_2	66.673	8.2
S90_2	75.453	5
R5	75.452	5
S103_1	67.075	5
S90_1	91.328	5
S99_2	94.48	5.244
R4_1	73.607	27.172
S99_2	94.48	5.244
R4_1	73.607	27.172
R4_2	35.962	5
S103_2	64.358	5
S117	72.355	9.198
S126	82.568	5.008
S121	80.59	5
S126	82.568	5.008
S117	72.355	9.198
S97_2	79.665	5

ENVIRONMENTAL PARTNERS

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Attachment 3.1

Existing Hydrology Map

Provincetown, MA

3/21/2024

0 500 1,000 2,000 Feet

AM0860 - 353

Proposal No. 608744-136412

E:\Provincetown.T151115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\1 - Existing Subcatchments Figure

Disclaimer: This map is intended for planning purposes

ATTACHMENT 3.2

Proposed Hydrology Map – Subcatchments and Time of Concentration

Proposed Tc Paths

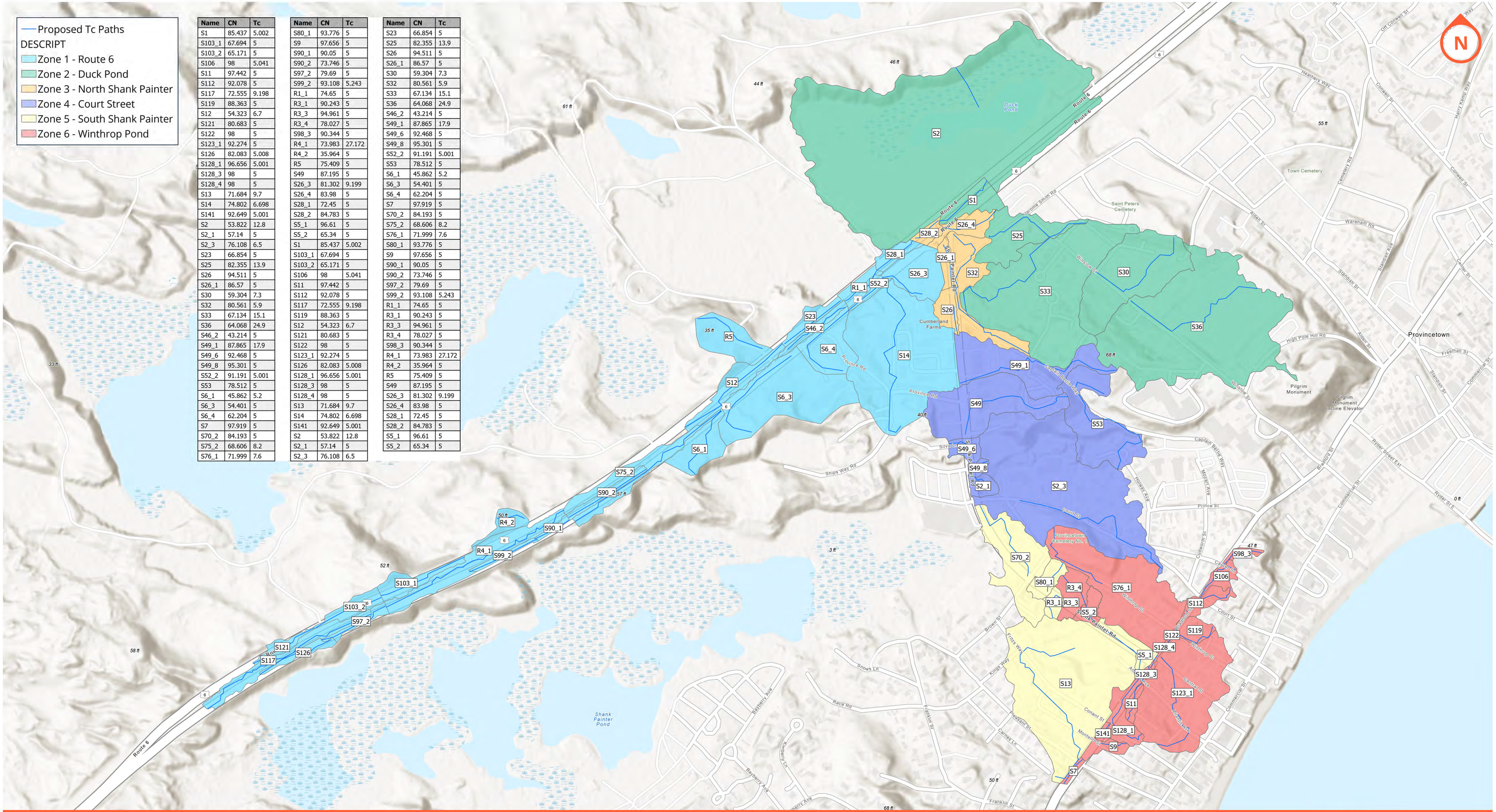
DESCRIPT

- Zone 1 - Route 6
- Zone 2 - Duck Pond
- Zone 3 - North Shank Painter
- Zone 4 - Court Street
- Zone 5 - South Shank Painter
- Zone 6 - Winthrop Pond

Name	CN	Tc
S1	85.437	5.002
S103_1	67.694	5
S103_2	65.171	5
S106	98	5.041
S11	97.442	5
S112	92.078	5
S117	72.555	9.198
S119	88.363	5
S12	54.323	6.7
S121	80.683	5
S122	98	5
S123_1	92.274	5
S126	82.083	5.008
S128_1	96.656	5.001
S128_3	98	5
S128_4	98	5
S13	71.684	9.7
S14	74.802	6.698
S141	92.649	5.001
S2	53.822	12.8
S2_1	57.14	5
S2_3	76.108	6.5
S23	66.854	5
S25	82.355	13.9
S26	94.511	5
S26_1	86.57	5
S30	59.304	7.3
S32	80.561	5.9
S33	67.134	15.1
S36	64.068	24.9
S46_2	43.214	5
S49_1	87.865	17.9
S49_6	92.468	5
S49_8	95.301	5
S52_2	91.191	5.001
S53	78.512	5
S6_1	45.862	5.2
S6_3	54.401	5
S6_4	62.204	5
S7	97.919	5
S70_2	84.193	5
S75_2	68.606	8.2
S76_1	71.999	7.6

Name	CN	Tc
S80_1	93.776	5
S9	97.656	5
S90_1	90.05	5
S90_2	73.746	5
S97_2	79.69	5
S99_2	93.108	5.243
R1_1	74.65	5
R3_1	90.243	5
R3_3	94.961	5
R3_4	78.027	5
S98_3	90.344	5
R4_1	73.983	27.172
R4_2	35.964	5
R5	75.409	5
S49	87.195	5
S26_3	81.302	9.199
S26_4	83.98	5
S28_1	72.45	5
S28_2	84.783	5
S5_1	96.61	5
S5_2	65.34	5
S1	85.437	5.002
S103_1	67.694	5
S103_2	65.171	5
S106	98	5.041
S11	97.442	5
S112	92.078	5
S117	72.555	9.198
S119	88.363	5
S12	54.323	6.7
S121	80.683	5
S122	98	5
S123_1	92.274	5
S126	82.083	5.008
S128_1	96.656	5.001
S128_3	98	5
S128_4	98	5
S13	71.684	9.7
S14	74.802	6.698
S141	92.649	5.001
S2	53.822	12.8
S2_1	57.14	5
S2_3	76.108	6.5

Name	CN	Tc
S23	66.854	5
S25	82.355	13.9
S26	94.511	5
S26_1	86.57	5
S30	59.304	7.3
S32	80.561	5.9
S33	67.134	15.1
S36	64.068	24.9
S46_2	43.214	5
S49_1	87.865	17.9
S49_6	92.468	5
S49_8	95.301	5
S52_2	91.191	5.001
S53	78.512	5
S6_1	45.862	5.2
S6_3	54.401	5
S6_4	62.204	5
S7	97.919	5
S70_2	84.193	5
S75_2	68.606	8.2
S76_1	71.999	7.6
S80_1	93.776	5
S9	97.656	5
S90_1	90.05	5
S90_2	73.746	5
S97_2	79.69	5
S99_2	93.108	5.243
R1_1	74.65	5
R3_1	90.243	5
R3_3	94.961	5
R3_4	78.027	5
S98_3	90.344	5
R4_1	73.983	27.172
R4_2	35.964	5
R5	75.409	5
S49	87.195	5
S26_3	81.302	9.199
S26_4	83.98	5
S28_1	72.45	5
S28_2	84.783	5
S5_1	96.61	5
S5_2	65.34	5



ENVIRONMENTAL PARTNERS

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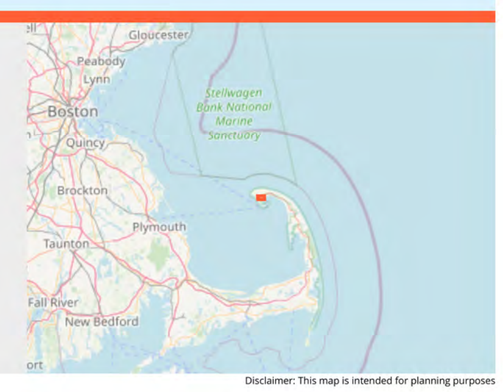
Attachment 3.2

Proposed Hydrology Map

Provincetown, MA

3/21/2024

0 500 1,000 2,000 Feet



t:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\1 - Proposed Subcatchments Figure\Existing Subcatchments Figure

Disclaimer: This map is intended for planning purposes

AM0860 - 357

Proposal No. 608744-13641

ATTACHMENT 3.3

Existing Drainage Features

- Existing Outfalls
- Existing Storage Nodes
- Existing Junctions
- Existing Orifices
- Existing Conduits

N

Duck Pond
DuckPond
OF-SP-1-WJ
CB1
MH11
GB2
CB3
CB4
MH2
MH3
CB101
J563
CB102
J564
MH4
CB6
MH5
J31
J30
OF-RS-13-S
OF-RS-12-N
CB35
J32
CB36
CB37
CB38
DW1
J29
J28
J27
OF-RS-11-N
J22
J24
DW2
DW4/CB
DW3/CB
DW5
DW6
DW7
DW8
CourtStWetlandArea
J100
J121
J9
J10
OF-RS-10-S
OF-RS-9-N
J16
J17
OF-RS-8-N
J14
J15
J25
J26
OF-RS-7-S
OF-RS-6-N
J1
J3
GB23
CB34
WinthropPond
CB24
MH14
MH13
MH12
CB31
CB32
MH1
CB26
MH18
CB33
CB27
MH10
MH9
CB29
MH8
DW#9
CB30
MH15
MH16
MH17
CB103
J565
CB104
J566
CB105
Route 6
Shank Painter Rd
Province Rd
Ships Way Rd
Race Rd
Court St
Winthrop St
Bradford St
Carver St
Commercial St
Atlantic Ave
Central St
Prince St
Captain Bertie Way
Winslow St
Aldrin St
Robbins Ave
Franklin St
Pleasant St
Conant St
Brown St
Bayberry Ave
Kimberly Ln
Gurnes Ln
Clapps Pond
Shank Painter Pond
Cumberland Farms
Provincetown Cemetery No. 1
Saint Peters Cemetery
Veterans Elementary School
Pilgrim Monument
High Pole Hill
Town Cemetery
Provincetown High School

ENVIRONMENTAL PARTNERS
— An Apex Company —

Attachment 3.3

Existing Drainage Features

Provincetown, MA

3/22/2024

0 500 1,000 2,000 Feet

Gloucester, Peabody, Lynn, Boston, Quincy, Brockton, Plymouth, Taunton, Fall River, New Bedford, Stellwagen Bank National Marine Sanctuary

AW8860 - 361

Proposal No. 608744-136412

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Disclaimer: This map is intended for planning purposes

ATTACHMENT 3.4

Proposed Drainage Features

- Proposed Outfalls
- Proposed Storage Nodes
- Proposed Junctions
- Proposed Conduits
- Proposed Weirs
- Proposed Pumps
- Proposed Orifices

N

DuckPond
Duck Pond
OF-SP-1-WI
CB1
CB2
MH1
CB3
CB10
Rt6Basin_OF
Rt6Basin&Forebay
MH2
J24
MH3
CB101
DMH-03
DMH-06
MH4
Rt6Drywells
DMH-07
DMH-08
DMH-09
J31
J30
OF-RS-13-S
OF-RS-12-N
CB35
CB36
CB37
CB38
J32
J71
J28
J29
J27
Province Rd
OF-RS-11-N
J2
J15
J9
J10
OF-RS-10-S
OF-RS-9-N
J16
J17
OF-RS-8-N
J14
J15
Route 6
J25
J26
OF-RS-7-S
OF-RS-6-N
J1
J3
J4
J7
OF-RS-5-S
J5
J8
OF-RS-4-S
OF-RS-3-N
J13
J11
Clapps Pond
Shank Painter Pond
Cumberland Farms
StillingBasin
DMH-10
DMH-12
DMH-16
DMH-14
DMH-18
Strand St
Ships Way Rd
CourtStWetlandArea
CourtStPond_Outlet
DMH-17
DMH-15
DMH2
CB4
CB6
DMH1
DMH-16
PSWetPump
PSWetWell
DMH3
Court St
Prince St
Captain Bertie Way
Veterans Elementary School
Pilgrim Monument
High Pole Hill Rd
Winslow St
Town Cemetery
Saint Peters Cemetery
Alden St
Jason Smith Rd
J564
CB112
J141
J145
CB104
Provincetown High 365
CB105
J155
Harwich Ave
Provincetown Cemetery No. 1
DMH-25
DMH-26
DMH-27
DMH-28
DMH-30
WinthropPond
DMH-31
SW1
SouthSPPond0F
DMH-32
MH12
CB31
CB32
MH11
CB28
CB33
MH10
CB27
MH9
CB29
MH8
DW#9
CB30
MH14
MH13
Goulart Memorial Dr
Gosnold St
Court St
Winthrop St
Central St
Commercial St
Atlantic Ave
Bayberry Ave
Race Rd
Franklin St
Pleasant St
Conant St
MH15
MH16
MH17
Carmen Ln
Kimberly Ln
Brown St
Howard St
Bradford St
Route 6
Gloucester
Peabody
Lynn
Boston
Quincy
Brockton
Plymouth
Taunton
Fall River
New Bedford
Steilwagen Bank National Marine Sanctuary

ENVIRONMENTAL PARTNERS
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Attachment 3.4

Proposed Drainage Features

Provincetown, MA

3/22/2024

0 500 1,000 2,000 Feet

A008660 - 365

Proposal No. 608744-136412

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Disclaimer: This map is intended for planning purposes

ATTACHMENT 4.1

Standard 1: Peak Velocities

Shank Painter Road and Route 6 Reconstruction Project
Provincetown, MA
Stormwater Report Attachment 4.1

Standard 1 - Velocities	Existing Discharge		Proposed Discharge		Outlet Controls
	2-yr 24-hr	10-yr 24-hr	2-yr 24-hr	10-yr 24-hr	
Zone 1 - Route 6 Analysis Points					
OF-RS-6-N	4.6	5.8	4.6	5.8	No changes to the existing outfall. Negligible increase in velocity.
OF-RS-7-S	8.0	9.9	8.1	9.9	No changes to the existing outfall. Negligible increase in velocity.
OF-RS-8-N	5.5	6.2	5.0	6.2	No changes to the existing outfall
OF-RS-9-N	4.0	4.6	3.6	4.6	No changes to the existing outfall
OF-RS-10-S	6.8	8.3	6.5	8.2	No changes to the existing outfall
OF-RS-11-N	6.1	8.0	6.4	8.2	No changes to the existing outfall
OF-RS-12-N	7.5	11.5	7.5	11.1	No changes to the existing outfall
OF-RS-13-S	9.7	10.9	5.5	8.0	No changes to the existing outfall
Zone 2 - Duck Pond Analysis Point					
OF-SP-1-WJ	14.3	14.6	13.8	14.4	No changes to the existing outfall
Zone 3 - North Shank Painter Analysis Point					
Rt 6 Basin OF	N/A[1]	N/A[1]	2.0	2.8	The water overflows from the infiltration basin across a rip rap lined weir.
Zone 4 - Court Street Analysis Points					
Existing Court St OF-1	*4.4*	*5.2*	*N/A*	*N/A*	
Existing Court St OF-2	*3.4*	*3.4*	*N/A*	*N/A*	
Proposed Court St OF	*N/A*	*N/A*	*6.7*	*7.6*	
Overland Flow[2]	*1.2*	*1.9*	*0.0*	*0.0*	
Court St Wetland (Highest Value)	4.4	5.2	6.7	7.6	The new outfall will have a rip rap apron
Court St Wetland Riprap velocity			2.8	3.3	Velocities are permissible
Zone 5 - South Shank Painter Analysis Points					
Overland Flow[3]	*1.2*	*1.6*	*1.1*	*0.9*	
Proposed South Shank Painter Outfall	*N/A*	*N/A*	*7.5*	*7.0*	
South Shank Painter Wetland (Highest Value)	1.2	1.6	7.5	7.0	The new outfall will have a rip rap apron
South Shank Painter Wetland Riprap velocity			2.7	3.1	Velocities are permissible

A00860 - 369

Proposal No. 608744-136412

Standard 1 - Velocities	Existing Discharge		Proposed Discharge		Outlet Controls
	2-yr 24-hr	10-yr 24-hr	2-yr 24-hr	10-yr 24-hr	
Zone 6 - Winthrop Pond Analysis Points					
Existing Winthrop OF-1	*2.4*	*4.0*	*N/A*	*N/A*	
Existing Winthrop OF-2	*6.8*	*7.0*	*6.4*	*6.6*	
Overland Flow [4]	*3.0*	*3.7*	*3.1*	*3.5*	
Winthrop Wetland OF (Highest Value)	6.8	7.0	6.4	6.6	No changes to the existing outfall

1. Existing flow in Zone 3 was directed to Zone 2 outfall OF-SP-1-WJ.
2. Conduits with overland flow have the tag "2D_Court".
3. Conduits with overland flow have the tag "2D_SouthShankPainter".
4. Conduits with overland flow have the tag "2D_Winthrop".
5. Rip rap velocities are calculated with the following assumptions:
   a. Used the mannings open flow equation to calculate the velocity from the peak flows for each storm.
   b. Cross section for manning equation is a rip rap pad that is 5' wide, with a 1% slope.
   c. Manning's n value based on equation 6 in USGS 1986 report titled "Rock Riprap Design for Protection of Stream Channels near Highway Structures, Volume 1."

Key

Green highlighted cells either show a decrease in peak velocity or permissible velocities (less than 4 fps).

Grey highlighted cells show multiple analysis points compared for each wetland area.

A00860 - 370

Proposal No. 608744-136412

ATTACHMENT 4.2

Standard 2: Peak Flow Rates

Shank Painter Road and Route 6 Reconstruction Project
Provincetown, MA
Stormwater Report Attachment

	Existing Peak Flows (cfs)			Proposed Peak Flows (cfs)		
	2-yr 24-hr	10-yr 24-hr	100-yr 24hr	2-yr 24-hr	10-yr 24-hr	100-yr 24hr
Zone 1 - Route 6 Analysis Points						
OF-RS-6-N	0.7	1.5	3.2	0.7	1.6	3.3
OF-RS-7-S	1.5	3.3	6.7	1.6	3.4	6.8
OF-RS-8-N	0.6	0.9	1.4	0.6	0.9	1.4
OF-RS-9-N	0.3	0.5	0.8	0.3	0.5	0.7
OF-RS-10-S	0.5	1.0	1.8	0.4	0.9	1.7
OF-RS-11-N	0.8	2.2	5.9	0.9	2.4	6.2
OF-RS-12-N	2.4	9.1	15.7	2.4	8.7	23.7
OF-RS-13-S	7.6	8.5	8.8	3.3	6.3	8.5
Zone 2 - Duck Pond Analysis Point						
OF-SP-1-WJ	6.6	8.7	10.2	5.2	7.5	9.3
Zone 3 - North Shank Painter Analysis Point						
Rt 6 Basin OF	N/A[1]	N/A[1]	N/A[1]	13.8	18.8	26.6
Duck Pond Combined Flow	6.6	8.7	10.2	19.0	26.3	35.9
Zone 4 - Court Street Analysis Points						
Existing Court St OF-1	*0.6*	*1.1*	*1.8*	*N/A*	*N/A*	*N/A*
Existing Court St OF-2	*2.7*	*2.7*	*2.7*	*N/A*	*N/A*	*N/A*
Proposed Court St OF	*N/A*	*N/A*	*N/A*	*11.9*	*19.6*	*30.9*
Overland Flow[2]	*7.2*	*13.7*	*23.9*	*0.0*	*0.0*	*0.0*
Court St Wetland (Total)	10.5	17.4	28.4	11.9	19.6	30.9
Zone 5 - South Shank Painter Analysis Points						
Overland Flow[3]	*4.1*	*9.4*	*16.6*	*3.9*	*9.7*	*18.2*
Proposed South Shank Painter Outfall	*N/A*	*N/A*	*N/A*	*6.8*	*7.5*	*7.6*
South Shank Painter Wetland (Total)	4.1	9.4	16.6	10.8	17.2	25.8

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	Existing Peak Flows (cfs)			Proposed Peak Flows (cfs)		
	2-yr 24-hr	10-yr 24-hr	100-yr 24hr	2-yr 24-hr	10-yr 24-hr	100-yr 24hr
Zone 6 - Winthrop Pond Analysis Points						
Existing Winthrop OF-1	*1.9*	*3.1*	*4.2*	*N/A*	*N/A*	*N/A*
Existing Winthrop OF-2	*11.8*	*12.4*	*13.2*	*11.4*	*11.7*	*12.0*
Overland Flow [4]	*2.6*	*10.2*	*41.8*	*3.0*	*11.8*	*43.1*
Winthrop Wetland OF (Total)	16.2	25.7	59.2	14.3	23.5	55.0

1. Existing flow in Zone 3 was directed to Zone 2 outfall OF-SP-1-WJ.
2. Conduits with overland flow have the tag "2D_Court".
3. Conduits with overland flow have the tag "2D_SouthShankPainter".
4. Conduits with overland flow have the tag "2D_Winthrop".

Key:

Increase from Existing

Decrease from Existing

ATTACHMENT 4.3

Standard 3: Recharge Volume Calculations

Shank Painter Road and Route 6 Reconstruction Project
Provincetown, MA
Stormwater Report Attachment

	Required Recharge Volume Calculations (Rv)					
SC ZONE	Existing Impervious Area (sf)	Proposed Impervious Area (sf)	Proposed minus Existing Imp. Area (sf)	Soil Type	Target Depth (F) (inch)	Required Recharge Volume[5] (cf)
Zone 1 - Route 6	691,070	699,875	8,805	A	0.6	440
Zone 2 - Duck Pond	674,663	671,712	-2,951	A	0.6	0
Zone 3 - North Shank Painter	128,852	134,066	5,214	A	0.6	261
Zone 4 - Court Street	667,394	671,084	3,690	A	0.6	185
Zone 5 - South Shank Painter	400,089	412,162	12,073	A	0.6	604
Zone 6 - Winthrop Pond	526,628	531,325	4,697	A	0.6	235
Totals	*3,088,696*	*3,120,223*	*31,527*			*1,724*

	Required Storage Volume Calculations (V)					
SC ZONE	Soil Type	K, Sat Hyd Cond. (In/hr)	Selected Depth of Infiltration BMP (ft)	Required Area[6] A (sf)	Storage Volume[7] (cf)	Drawdown time[8] (hrs)
Zone 1 - Route 6	Sand	8.27	5	69.0	345.1	9.3
Zone 2 - Duck Pond	Sand	8.27	5	0.0	0.0	0.0
Zone 3 - North Shank Painter	Sand	8.27	5	40.9	204.3	9.3
Zone 4 - Court Street	Sand	8.27	5	28.9	144.6	9.3
Zone 5 - South Shank Painter	Sand	8.27	5	94.6	473.2	9.3
Zone 6 - Winthrop Pond	Sand	8.27	5	36.8	184.1	9.3
Totals					*1,351*	

Notes:

1. Impervious area calculated manually from drawings.
2. Soil Types are from NRCS GIS data layers
3. The higher soil type was used, if 2 or more in same outfall area.
4. Simple Dynamic Method used for sizing
5. Required recharge volume equation: Rv=F*impervious area
6. Required area equation: A = Rv / (D+KT), where T=2hrs
7. Storage volume equation: V = A*D
8. Drawdown time equation: Td = Rv / (K*A)

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Proposal No. 608744-136412

ATTACHMENT 4.4

Standard 3: Infiltration Volumes

Shank Painter Road and Route 6 Reconstruction Project
Provincetown, MA
Stormwater Report Attachment 4.4

Area	Existing Infiltration[1]		Proposed Infiltration		Required Volumes
	Structures	Volume[2] (CF)	Structure	Volume	Standard 3
Zone 1, Route 6	-	-	-	-	345.1
Zone 2, Duck Pond	-	-	-	-	0.0
Zone 3, North Shank Painter	-	-	Four drywells	565	204.3
			Forebay and Infiltration Basin	10,310	
Zone 4, Court Street[3]	24	3,400	-	-	144.6
Zone 5, South Shank Painter	-	-	Infiltration Chambers	3,730	473.2
Zone 6, Winthrop	-	-	-	-	184.1

1. Within project limits.
2. Assumes structures are 6' diameter, 5' deep drywells.
3. Court Street is directed to the new North Shank Painter outfall through the forebay and infiltration basin. Therefore, the required standard 3 recharge volume is met through the forebay and infiltration basin volumes.

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ATTACHMENT 4.5

Standard 4: Water Quality Volume Calculations

Shank Painter Road and Route 6 Reconstruction Project
Provincetown, MA
Stormwater Report Attachment

Required Storage Volume Calculations (V)

Zone	Proposed Impervious Area (sf)	Within Zone II, Wellhead Protection Area, Near Critical Area, runoff from LUHPPL, or exfil from soils > 2.4in/hr or greater??	Dwq (WQ Depth) (inch)	Vwq[1], Required Water Quality Volume (cf)	Soil Type	K, Sat Hyd Cond. (In/hr)
Zone 1 - Route 6	699,875	yes	1	58322.92	Sand	8.27
Zone 2 - Duck Pond	671,712	yes	1	55976.00	Sand	8.27
Zone 3 - North Shank Painter	134,066	yes	1	11172.13	Sand	8.27
Zone 4 - Court Street	671,084	yes	1	55923.67	Sand	8.27
Zone 5 - South Shank Painter	412,162	yes	1	34346.81	Sand	8.27
Zone 6 - Winthrop Pond	531,325	yes	1	44277.08	Sand	8.27
Totals	*3,120,223*			*260018.61*		

Zone	Selected Depth (D) of Infiltration BMP (ft)	Required Area A[2] (sf)	Required Storage Volume for Water Quality[3] (cf)	Forebay Sizing (cf)	Forebay Bottom Size (sf)
Zone 1 - Route 6	5	9143.9	**45719.6**	**5832.3**	1166.5
Zone 2 - Duck Pond	5	8776.0	**43879.8**	**5597.6**	1119.5
Zone 3 - North Shank Painter	5	1751.6	**8757.9**	**1117.2**	223.4
Zone 4 - Court Street	5	8767.8	**43838.8**	**5592.4**	1118.5
Zone 5 - South Shank Painter	5	5384.9	**26924.6**	**3434.7**	686.9
Zone 6 - Winthrop Pond	5	6941.8	**34709.0**	**4427.7**	885.5
			40765.9	*203829.6*	

Notes:
1. Vwq = Dwq/12 * Aimp
2. A = Vwq / (D+2*K/12)
3. V = A*D
4. Forebay Size = Impervious area * 0.1in/(12in/ft)

Proposal No. 608744-136412

ATTACHMENT 4.6

Standard 4: TSS Removal Calculations

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 1 - Route 6

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95

Total TSS Removal = 5%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 3/29/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 2 - Duck Pond

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95

Total TSS Removal = 5%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 3/29/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

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Proposal No. 608744-136412

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 3 - North Shank Painter Dry Wells

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Dry Well	0.80	0.71	0.57	0.14
Sediment Forebay	0.25	0.14	0.04	0.11
Infiltration Basin	0.80	0.11	0.09	0.02

Total TSS Removal = 98%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 3/29/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 3 - North Shank Painter Infiltration Basin

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Sediment Forebay	0.25	0.71	0.18	0.53
Infiltration Basin	0.80	0.53	0.43	0.11
	0.00	0.11	0.00	0.11

Total TSS Removal = 89%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 3/29/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

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Proposal No. 608744-136412

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 4 - Shank Painter to Court Street Wetland

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
	0.00	0.71	0.00	0.71
	0.00	0.71	0.00	0.71
	0.00	0.71	0.00	0.71

Total TSS Removal = 29%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 5/1/2025

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 4 - Court St (301) and Zone 5 SSP (401)

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Proprietary Treatment Practice	0.00	0.71	0.00	0.71
	0.00	0.71	0.00	0.71
	0.00	0.71	0.00	0.71

Total TSS Removal = 29%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 5/1/2025

Refer to page 8 for complete calculations.

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 5 - S. Shank Painter Infiltration Chambers 402

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Proprietary Treatment Practice	0.00	0.71	0.00	0.71
Subsurface Infiltration Structure	0.80	0.71	0.57	0.14
	0.00	0.14	0.00	0.14

Total TSS Removal = 86%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 3/30/2024

Refer to page 8 for complete calculations.

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

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Shank Painter Road and Route 6 Reconstruction Project
Provincetown, MA
Stormwater Report Attachment

Propreitary Treatment Practices

Hydrodynamic Separators Peak Flows	10yr Flow (cfs)	1" Flow (cfs)	Acceptable Hydrodynamic Models		
HDS 301: Court Street Pump Station	18.7	0.07	STC900	CS-3	CDS 2015-4
HDS 401: South Shank Painter Wetland	9.4	0.41	STC900	CS-3	CDS 2015-4
HDS 402: Infiltration Chambers	2	0.46	STC900	CS-3	CDS 2015-4

Treatment Train (301,401)

B BMP	C TSS Removal Rate1	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	5%	100%	5%	95%
Deep Sump and Hooded Catch Basin	25%	95%	24%	71%
Proprietary Treatment Practice	80%	71%	57%	14%

Total TSS Removal Rate 86%

Treatment Train (402)

B BMP	C TSS Removal Rate1	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	5%	100%	5%	95%
Deep Sump and Hooded Catch Basin	25%	95%	24%	71%
Proprietary Treatment Practice	80%	71%	57%	14%
Subsurface Infiltration Structure	80%	14%	11%	3%

Total TSS Removal Rate 97%

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Zone 6 - Winthrop Pond

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95
	0.00	0.95	0.00	0.95

Total TSS Removal = 5%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Shank Painter Road and Route 6 Reconstruction

Prepared By: MEG

Date: 3/29/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

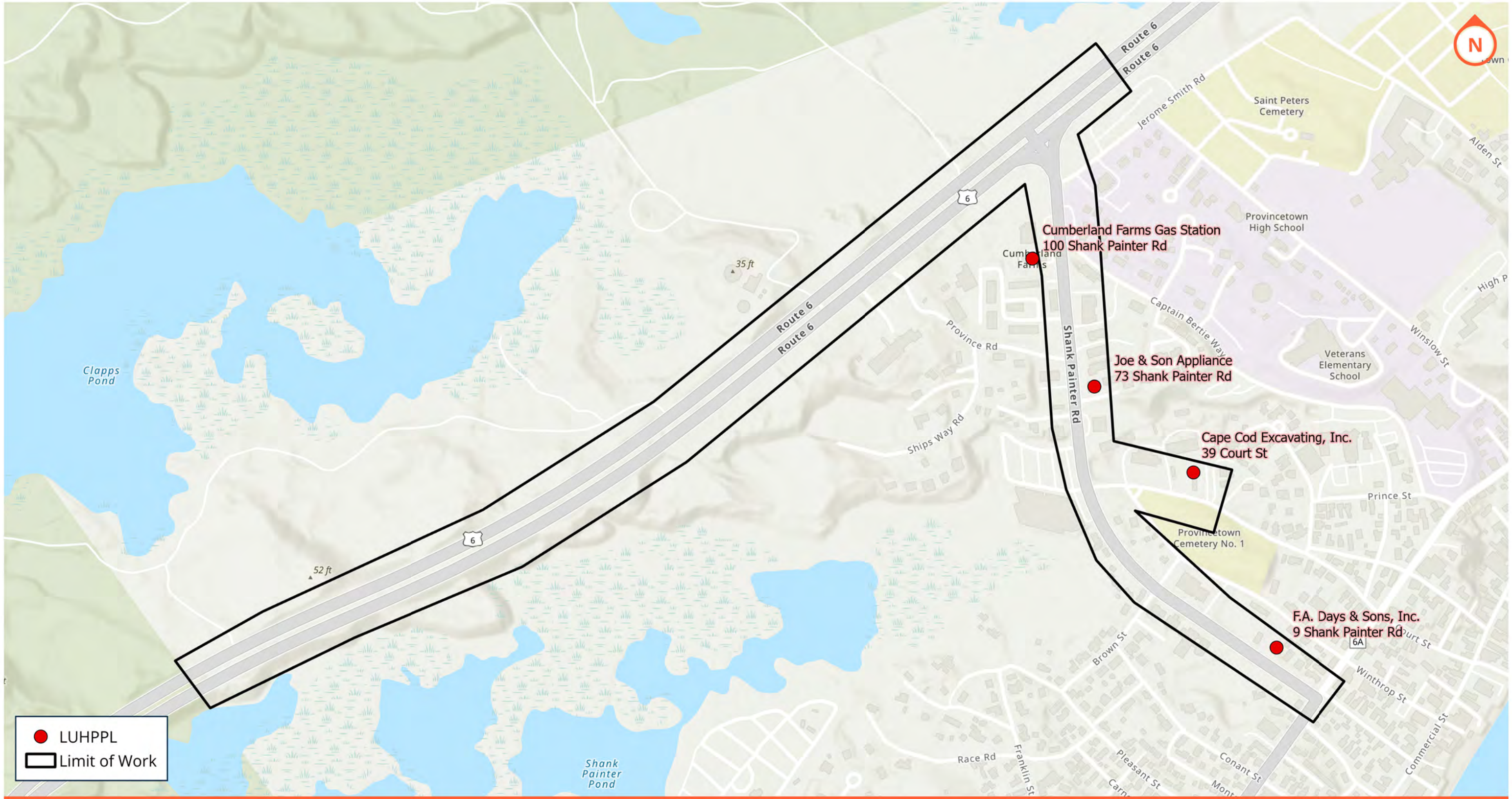
1. From MassDEP Stormwater Handbook Vol. 1

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Proposal No. 608744-136412

ATTACHMENT 4.7

Standard 5: LUHPPL Areas



Attachment 4.6

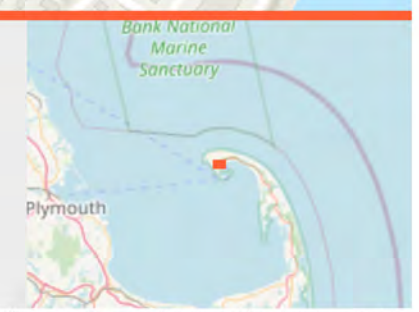
LUHPPL Areas

Provincetown, MA

3/22/2024

0 500 1,000 2,000 Feet

ENVIRONMENTAL PARTNERS
— An Apex Company —



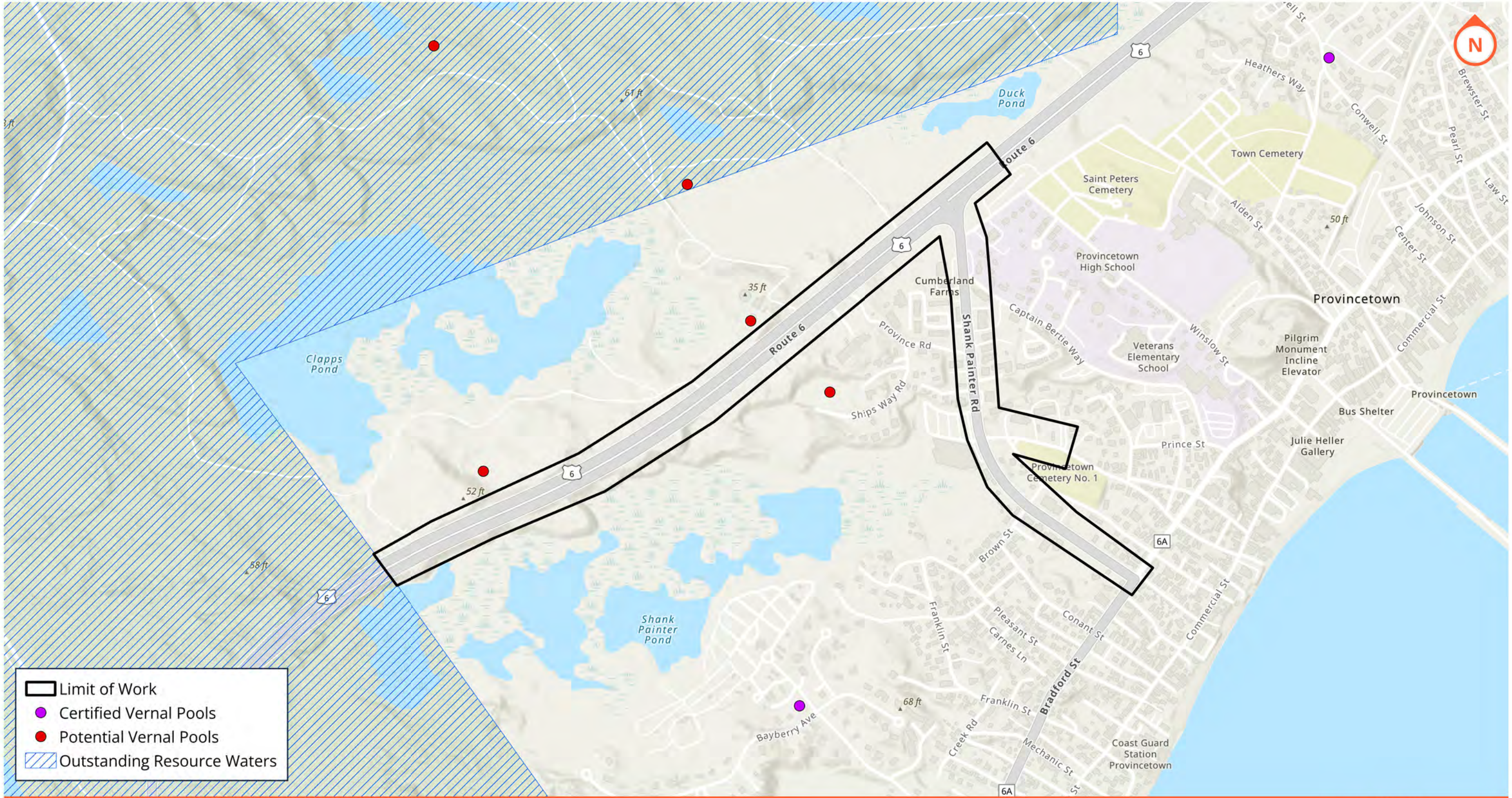
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Disclaimer: This map is intended for planning purposes

ATTACHMENT 4.8

Standard 6: Critical Areas - Outstanding Resource Waters, Vernal Pools, MassDEP Wetlands, and FEMA Flood Maps

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ENVIRONMENTAL PARTNERS
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Attachment 4.7
Critical Areas
Provincetown, MA
3/21/2024

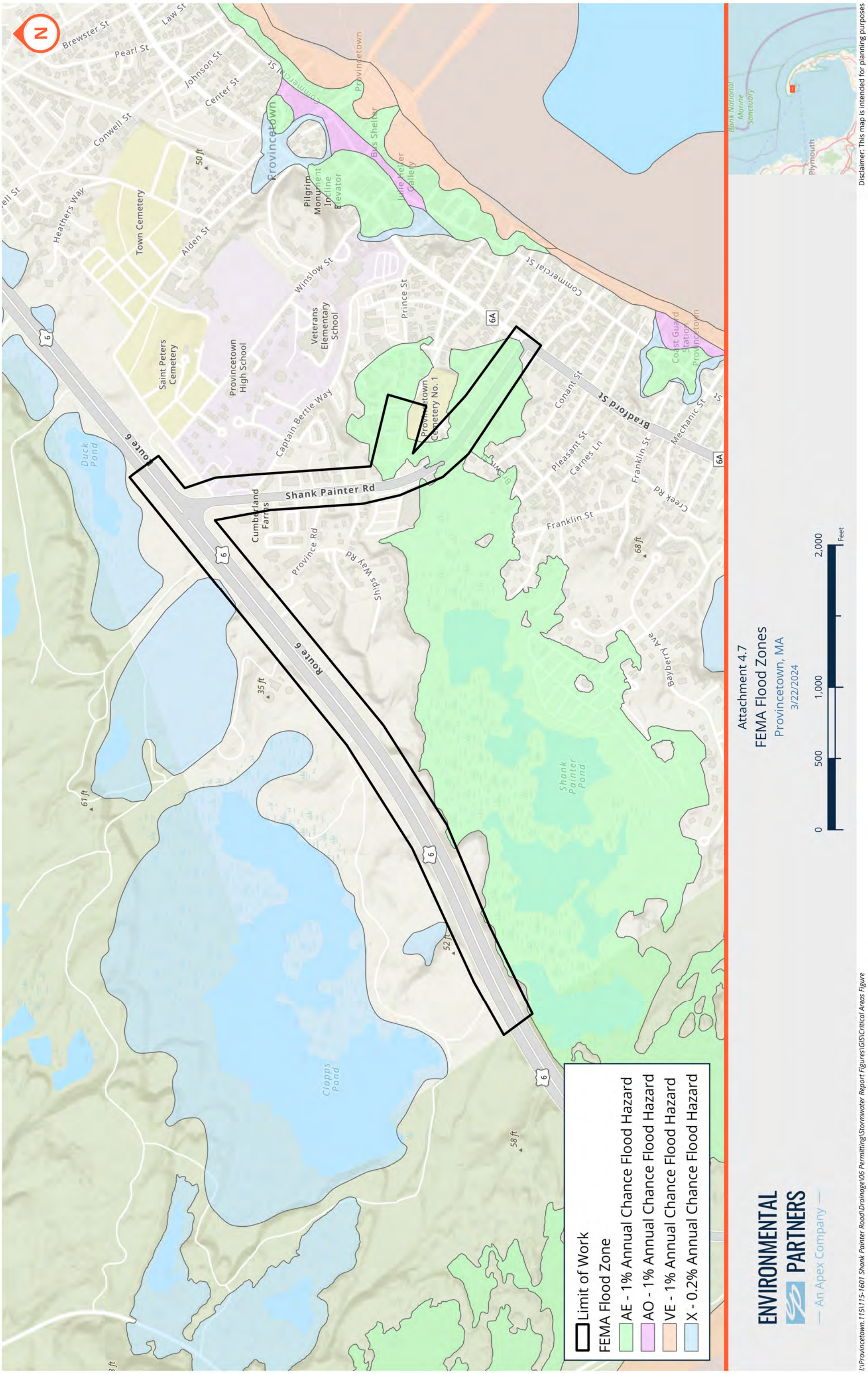
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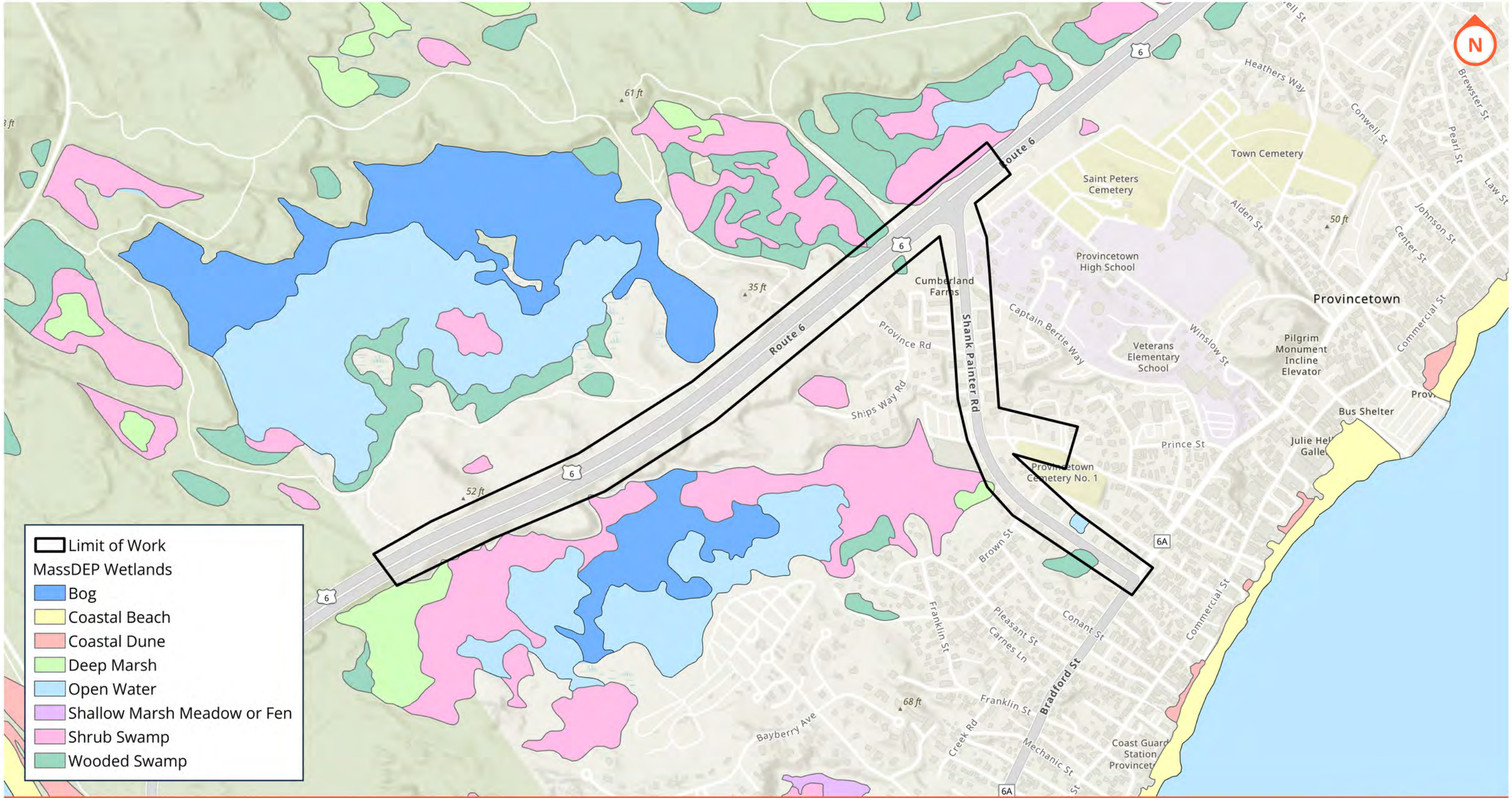


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Disclaimer: This map is intended for planning purposes

Proposal No. 608744-136412


Limit of Work
FEMA Flood Zone
AE - 1% Annual Chance Flood Hazard
AO - 1% Annual Chance Flood Hazard
VE - 1% Annual Chance Flood Hazard
X - 0.2% Annual Chance Flood Hazard
Attachment 4.7
FEMA Flood Zones
Provincetown, MA
3/22/2024
0
500
1,000
2,000
Feet
ENVIRONMENTAL PARTNERS
— An Apex Company —
Disclaimer: This map is intended for planning purposes
I:\Provincetown.115\115-1601 Shank Painter Road\Drainage\06 Permitting\Stormwater Report Figures\GIS\Critical Areas Figure
Shank Painter Rd
Route 6
Bradford St
Commercial St
Provincetown
Pilgrim Monument
Provincetown High School
Veterans Elementary School
Saint Peters Cemetery
Town Cemetery
Provincetown Cemetery No. 1
Cumberland Farms
Coast Guard Station
Bike Shelter
Julie Heller Gallery
Incline Elevator
Duck Pond
Shank Painter Pond
Clapps Pond
Bank National Marine Sanctuary
Plymouth



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Attachment 4.7
MassDEP Wetlands
Provincetown, MA
3/22/2024

0 500 1,000 2,000
Feet



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Disclaimer: This map is intended for planning purposes

ATTACHMENT 4.9

Standard 9: Operation and Maintenance Plan

OPERATION AND MAINTENANCE

Best Management Practices (BMPs) are policies, procedures, and structures designed to reduce stormwater pollution, prevent contaminant discharges to natural water bodies, and reduce stormwater facility maintenance costs. Constructed BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body.

This Standard Operating Procedure provides a general summary of inspection procedures for the constructed BMPs in the Shank Painter Road and Route 6 Reconstruction project. This SOP is based on the Massachusetts Stormwater Handbook and is not intended to replace that document.

The Capsular Pump Station on Court Street is based on a design by Smith and Loveless. A similar pump station's Operation and Maintenance Manual has been included as an example of what the Court Street Pump Station Operation and Maintenance Manual would look like. The official operation and maintenance manual is unique to each pump station and cannot be finalized until after the project has gone to bid and the winning contractor has selected and procured the pump station.

Structural Pretreatment BMPs

Deep Sump Catch Basin

Deep sump catch basins are underground detention systems designed to remove trash, debris, and coarse sediment from stormwater runoff, and serve as temporary spill containment devices or floatables such as oils and greases. All deep sump catch basins must include hoods.

Inspection and Maintenance

Regular maintenance is essential. Deep sump catch basins remain effective at removing pollutants only if they are cleaned out frequently. Clamshell buckets are typically used to remove sediment in Massachusetts. However, vacuum trucks are preferable, because they remove more trapped sediment and supernatant than clamshells.

Maintenance Schedule

Activity	Frequency
Inspect units	Four times per year.
Clean units	Four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

Unless there is evidence that they have been contaminated by a spill or other means, MassDEP does not routinely require catch basin cleanings to be tested before disposal. Contaminated catch basin cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000, and handled as hazardous waste. In the absence of evidence of contamination, catch basin cleanings may be taken to a landfill or other facility permitted by MassDEP to accept solid waste.

Proprietary Separators

A proprietary separator is a flow-through structure with a settling or separation unit to remove sediments and other pollutants. They typically use the power of swirling or flowing water to separate floatables and coarser sediments. Can be custom-designed to fit specific needs at a specific site.

Inspection and Maintenance

Inspect and clean these units in strict accordance with manufacturers' recommendations and requirements. Clean the units using the method specified by the manufacturer.

Maintenance Schedule

Activity	Frequency
Inspect in accordance with manufacturer requirements, but no less than twice a year following installation, and no less than once a year thereafter.	See activity.
Remove sediment and other trapped pollutants at frequency or level specified by manufacturer.	See manufacturer information.

Vactor trucks are typically used to clean these units. Clamshell buckets typically used for cleaning catch basins are almost never allowed by manufacturers. Sometimes it will be necessary to remove sediment manually.

Sediment Forebays

A sediment forebay is a post-construction practice consisting of an excavated pit, bermed area, or cast structure combined with a weir, designed to slow incoming stormwater runoff and facilitating the gravity separation of suspended solids.

Inspection and Maintenance

Sediments and associated pollutants are removed only when sediment forebays are actually cleaned out, so regular maintenance is essential. Frequently removing accumulated sediments will make it less likely that sediments will be re-suspended.

Maintenance Schedule: Sediment Forebays

Activity	Frequency
Inspect sediment forebays	Monthly.
Clean sediment forebays	Four times per year and when sediment depth is between 3 to 6 inches.

When mowing grasses, keep the grass height no greater than 6 inches. Set mower blades no lower than 3 to 4 inches. Check for signs of rilling and gullying and repair as needed. After removing the sediment, replace any vegetation damaged during the clean-out by either reseeding or re-sodding. When reseeding, incorporate practices such as hydroseeding with a tackifier, blanket, or similar practice to ensure that no scour occurs in the forebay, while the seeds germinate and develop roots.

Infiltration BMPs

Dry Wells

Dry wells are used to infiltrate uncontaminated runoff. Dry wells provide groundwater recharge and can reduce the size and cost required of downstream BMPs or storm drains. However, they are only applicable in drainage areas of less than one acre and may experience high failure rates due to clogging.

Inspection and Maintenance

Proper dry well function depends on regular inspection. Clogging has the potential to cause high failure rates. The water depth in the observation well should be measured at 24 and 48 hour intervals after a storm and the clearance rate calculated. The clearance rate is calculated by dividing the drop in water level (inches) by the time elapsed (hours).

Maintenance Schedule: Dry Wells

Activity	Frequency
Inspect dry wells	After every major storm for the first 3 months after construction completion. Annually thereafter.

Infiltration Basins

Infiltration basins are designed to contain stormwater quantity and provide groundwater recharge. Pollution prevention and pretreatment are required to ensure that contaminated stormwater is not infiltrated. Infiltration basins reduce local flooding and preserve the natural water balance of the

site, however high failure rates often occur due to improper siting, inadequate pretreatment, poor design and lack of maintenance.

Inspection and Maintenance

Regular maintenance is required to prevent clogging, which results in infiltration basin failure. Clogging may be due to upland sediment erosion, excessive soil compaction or low spots. Inspections should include signs of differential settlement, cracking, erosion, leakage in the embankments, tree growth on the embankments, riprap condition, sediment accumulation and turf health.

Maintenance Schedule: Infiltration Basins

Activity	Time of Year	Frequency
Preventative maintenance	Spring and Fall	Bi-Annually.
Inspection	Spring and Fall	After every major storm for the first 3 months after construction completion. Bi-annually thereafter and discharges through the high outlet orifice.
Mow/rake buffer area, side slopes and basin bottom	Spring and Fall	Bi-Annually.
Remove trash, debris and organic matter	Spring and Fall	Bi-Annually.

Infiltration Chambers

Subsurface structures are underground systems that capture runoff, and gradually infiltrate it into the groundwater through rock and gravel. The most common types include pre-cast concrete or plastic pits, chambers manufactured pipes), perforated pipes, and galleys.

Inspection and Maintenance

Because subsurface structures are installed underground, they are difficult to maintain.

Maintenance Schedule: Infiltration Chambers

Activity	Frequency
Inspect inlets and outlets.	Monthly for the first year, then Bi-Annually.
Remove debris that might clog the system.	Monthly for the first year, then Bi-Annually.

Check for depressions in area over and surrounding the stormwater management system.	Monthly for the first year, then Bi-Annually.
Inspect the interior of the stormwater management chambers through the inspection port.	Once, after 2 years.
Inspect the interior of the stormwater management chambers through the inspection port. Clean the interior of the chambers and feed connectors of any debris.	Every 9 years.

Attachments:

1. Structural Pretreatment BMP Inspection Form
2. Infiltration BMP Inspection Form
3. Contech Stormceptor Operation and Maintenance Guide
4. Cultec Operation and Maintenance Guide
5. EXAMPLE Smith and Loveless Capsular Pump Station Operation and Maintenance Manual, included under separate cover (1428 pages long) Available upon request

INSPECTION OF STRUCTURAL PRETREATMENT BMP

General Information

BMP Type (check box)	☐ Deep Sump Catch Basin	☐ Oil/Grit Separator
	☐ Proprietary Separator	☐ Sediment Forebay
	☐ Vegetative Filter Strip	
BMP Address:		
Inspector:	Weather:	
Date:	Start Time:	End Time:
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐		

Inspection Information

BMP Issues	Is Status of BMP Satisfactory?	BMP Issue Location/Amount	Corrective Action Needed
Soil Erosion (when applicable)	Yes ☐ No ☐		
Excess Vegetation (when applicable)	Yes ☐ No ☐		*Mow/Rake/Prune*
Trash/Debris	Yes ☐ No ☐		*Remove Trash*
Excess Sedimentation	Yes ☐ No ☐		*Remove Sediment*
Oil/Grease (when applicable)	Yes ☐ No ☐		
Inlet/Outlet Condition	Yes ☐ No ☐		
Clogging/Standing Water	Yes ☐ No ☐		
Other Issues	Yes ☐ No ☐		

INSPECTION OF INFILTRATION BMP

General Information

BMP Type (check box)	☐ Dry Well	☐ Infiltration Basin
	☐ Infiltration Trench	☐ Leaching Catch Basin
	☐ Subsurface Structure	
BMP Address:		
Inspector:	Weather:	
Date:	Start Time:	End Time:
Type of Inspection: Regular ☐ Pre-Storm Event ☐ During Storm Event ☐ Post-Storm Event ☐		

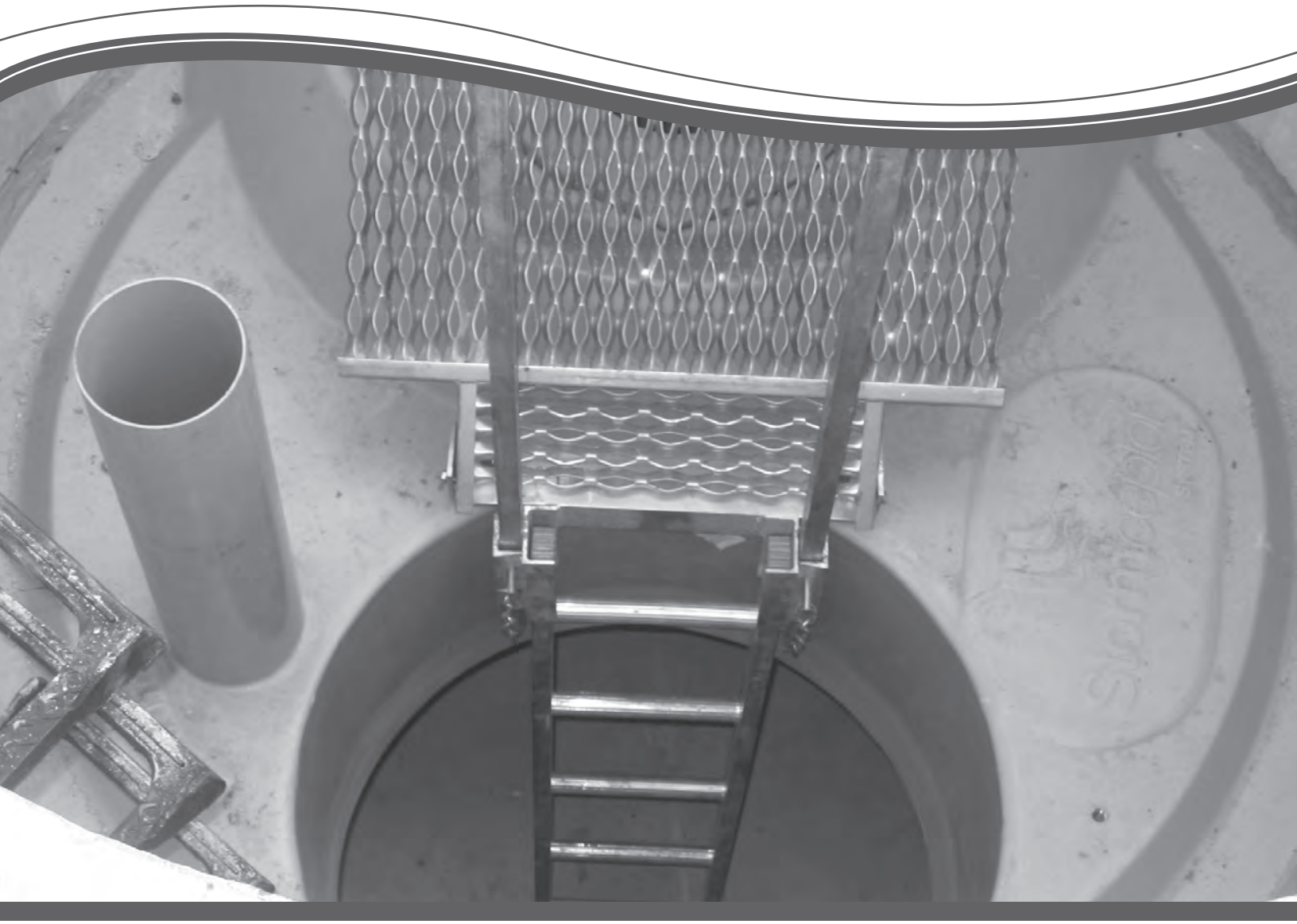
Inspection Information

BMP Issues	Is Status of BMP Satisfactory?	BMP Issue Location/Amount	Corrective Action Needed
Soil Erosion	Yes ☐ No ☐		
Excess Vegetation	Yes ☐ No ☐		*Mow/Rake/Prune*
Trash/Debris	Yes ☐ No ☐		*Remove Trash*
Excess Sedimentation	Yes ☐ No ☐		*Remove Sediment*
Inlet/Outlet Condition	Yes ☐ No ☐		
Clogging/Standing Water	Yes ☐ No ☐		
Other Issues	Yes ☐ No ☐		

Proposal No. 608744-136412

CONTECH®
ENGINEERED SOLUTIONS

Stormceptor® STC
Operation and Maintenance Guide



Stormceptor® STC

Stormceptor Design Notes

- Only the STC 450i is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 450i to STC 7200 may accommodate multiple inlet pipes.

Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences			
Inlet Pipe Configuration	STC 450i	STC 900 to STC 7200	STC 11000 to STC 16000
Single inlet pipe	3 in. (75 mm)	1 in. (25 mm)	3 in. (75 mm)
Multiple inlet pipes	3 in. (75 mm)	3 in. (75 mm)	Only one inlet pipe.

Maximum inlet and outlet pipe diameters:

Inlet/Outlet Configuration	Inlet Unit STC 450i	In-Line Unit STC 900 to STC 7200	Series* STC 11000 to STC 16000
Straight Through	24 inch (600 mm)	42 inch (1050 mm)	60 inch (1500 mm)
Bend (90 degrees)	18 inch (450 mm)	33 inch (825 mm)	33 inch (825 mm)

- The inlet and in-line Stormceptor units can accommodate turns to a maximum of 90 degrees.
- Minimum distance from top of grade to crown is 2 feet (0.6 m)
- Submerged conditions. A unit is submerged when the standing water elevation at the proposed location of the Stormceptor unit is greater than the outlet invert elevation during zero flow conditions. In these cases, please contact your local Stormceptor representative and provide the following information:
- Top of grade elevation
- Stormceptor inlet and outlet pipe diameters and invert elevations
- Standing water elevation
- Stormceptor head loss, K = 1.3 (for submerged condition, K = 4)

Stormceptor® STC

OPERATION AND MAINTENANCE GUIDE
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1. About Stormceptor

The Stormceptor® STC (Standard Treatment Cell) was developed by Imbrium™ Systems to address the growing need to remove and isolate pollution from the storm drain system before it enters the environment. The Stormceptor STC targets hydrocarbons and total suspended solids (TSS) in stormwater runoff. It improves water quality by removing contaminants through the gravitational settling of fine sediments and floatation of hydrocarbons while preventing the re-suspension or scour of previously captured pollutants.

The development of the Stormceptor STC revolutionized stormwater treatment, and created an entirely new category of environmental technology. Protecting thousands of waterways around the world, the Stormceptor System has set the standard for effective stormwater treatment.

1.1. Patent Information

The Stormceptor technology is protected by the following patents:

- Australia Patent No. 693,164 • 693,164 • 707,133 • 729,096 • 779401
- Austrian Patent No. 289647
- Canadian Patent No 2,009,208 •2,137,942 • 2,175,277 • 2,180,305 • 2,180,383 • 2,206,338 • 2,327,768 (Pending)
- China Patent No 1168439
- Denmark DK 711879
- German DE 69534021
- Indonesian Patent No 16688
- Japan Patent No 9-11476 (Pending)
- Korea 10-2000-0026101 (Pending)
- Malaysia Patent No PI9701737 (Pending)
- New Zealand Patent No 314646
- United States Patent No 4,985,148 • 5,498,331 • 5,725,760 • 5,753,115 • 5,849,181 • 6,068,765 • 6,371,690
- Stormceptor OSR Patent Pending • Stormceptor LCS Patent Pending

2. Stormceptor Design Overview

2.1. Design Philosophy

The patented Stormceptor System has been designed to focus on the environmental objective of providing long-term pollution control. The unique and innovative Stormceptor design allows for continuous positive treatment of runoff during all rainfall events, while ensuring that all captured pollutants are retained within the system, even during intense storm events.

An integral part of the Stormceptor design is PCSWMM for Stormceptor - sizing software developed in conjunction with Computational Hydraulics Inc. (CHI) and internationally acclaimed expert, Dr. Bill James. Using local historical rainfall data and continuous simulation modeling, this software allows a Stormceptor unit to be designed for each individual site and the corresponding water quality objectives.

By using PCSWMM for Stormceptor, the Stormceptor System can be designed to remove a wide range of particles (typically from 20 to 2,000 microns), and can also be customized to remove a specific particle size distribution (PSD). The specified PSD should accurately reflect what is in the stormwater runoff to ensure the device is achieving the desired water quality objective. Since stormwater runoff contains small particles (less than 75 microns), it is important to design a treatment system to remove smaller particles in addition to coarse particles.

2.2. Benefits

The Stormceptor System removes free oil and suspended solids from stormwater, preventing spills and non-point source pollution from entering downstream lakes and rivers. The key benefits, capabilities and applications of the Stormceptor System are as follows:

- Provides continuous positive treatment during all rainfall events
- Can be designed to remove over 80% of the annual sediment load
- Removes a wide range of particles
- Can be designed to remove a specific particle size distribution (PSD)
- Captures free oil from stormwater
- Prevents scouring or re-suspension of trapped pollutants
- Pre-treatment to reduce maintenance costs for downstream treatment measures (ponds, swales, detention basins, filters)
- Groundwater recharge protection
- Spills capture and mitigation
- Simple to design and specify
- Designed to your local watershed conditions
- Small footprint to allow for easy retrofit installations
- Easy to maintain (vacuum truck)
- Multiple inlets can connect to a single unit
- Suitable as a bend structure
- Pre-engineered for traffic loading (minimum AASHTO HS-20)
- Minimal elevation drop between inlet and outlet pipes
- Small head loss
- Additional protection provided by an 18" (457 mm) fiberglass skirt below the top of the insert, for the containment of hydrocarbons in the event of a spill.

2.3. Environmental Benefit

Freshwater resources are vital to the health and welfare of their surrounding communities. There is increasing public awareness, government regulations and corporate commitment to reducing the pollution entering our waterways. A major source of this pollution originates from stormwater runoff from urban areas. Rainfall runoff carries oils, sediment and other contaminants from roads and parking lots discharging directly into our streams, lakes and coastal waterways.

The Stormceptor System is designed to isolate contaminants from getting into the natural environment. The Stormceptor technology provides protection for the environment from spills that occur at service stations and vehicle accident sites, while also removing contaminated sediment in runoff that washes from roads and parking lots.

3. Key Operation Features

3.1. Scour Prevention

A key feature of the Stormceptor System is its patented scour prevention technology. This innovation ensures pollutants are captured and retained during all rainfall events, even extreme storms. The Stormceptor System provides continuous positive treatment for all rainfall events, including intense storms. Stormceptor slows incoming runoff, controlling and reducing velocities in the lower chamber to create a non-turbulent environment that promotes free oils and floatable debris to rise and sediment to settle.

The patented scour prevention technology, the fiberglass insert, regulates flows into the lower chamber through a combination of a weir and orifice while diverting high energy flows away through the upper chamber to prevent scouring. Laboratory testing demonstrated no scouring when tested up to 125% of the unit's operating rate, with the unit loaded to 100% sediment capacity (NJDEP, 2005). Second, the depth of the lower chamber ensures the sediment storage zone is adequately separated from the path of flow in the lower chamber to prevent scouring.

3.2. Operational Hydraulic Loading Rate

Designers and regulators need to evaluate the treatment capacity and performance of manufactured stormwater treatment systems. A commonly used parameter is the "operational hydraulic loading rate" which originated as a design methodology for wastewater treatment devices.

Operational hydraulic loading rate may be calculated by dividing the flow rate into a device by its settling area. This represents the critical settling velocity that is the prime determinant to quantify the influent particle size and density captured by the device. PCSWMM for Stormceptor uses a similar parameter that is calculated by dividing the hydraulic detention time in the device by the fall distance of the sediment.

$$v_{SC} = \frac{H}{6_H} = \frac{Q}{A_S}$$

Where:

v_{SC} = critical settling velocity, ft/s (m/s)

H = tank depth, ft (m)

$Ø_H$ = hydraulic detention time, ft/s (m/s)

Q = volumetric flow rate, ft3/s (m3/s)

A_S = surface area, ft^2 (m^2)

(Tchobanoglous, G. and Schroeder, E.D. 1987. Water Quality. Addison Wesley.)

Unlike designing typical wastewater devices, stormwater systems are designed for highly variable flow rates including intense peak flows. PCSWMM for Stormceptor incorporates all of the flows into its calculations, ensuring that the operational hydraulic loading rate is considered not only for one flow rate, but for all flows including extreme events.

3.3. Double Wall Containment

The Stormceptor System was conceived as a pollution identifier to assist with identifying illicit discharges. The fiberglass insert has a continuous skirt that lines the concrete barrel wall for a depth of 18 inches (457 mm) that provides double wall containment for hydrocarbons storage. This protective barrier ensures that toxic floatables do not migrate through the concrete wall into the surrounding soils.

4. Stormceptor Product Line

4.1. Stormceptor Models

A summary of Stormceptor models and capacities are listed in Table 1.

Table 1. Stormceptor Models

Stormceptor Model	Total Storage Volume U.S. Gal (L)	Hydrocarbon Storage Capacity U.S. Gal (L)	Maximum Sediment Capacity ft^3 (L)
STC 450i	470 (1,780)	86 (330)	46 (1,302)
STC 900	952 (3,600)	251 (950)	89 (2,520)
STC 1200	1,234 (4,670)	251 (950)	127 (3,596)
STC 1800	1,833 (6,940)	251 (950)	207 (5,861)
STC 2400	2,462 (9,320)	840 (3,180)	205 (5,805)
STC 3600	3,715 (1,406)	840 (3,180)	373 (10,562)
STC 4800	5,059 (1,950)	909 (3,440)	543 (15,376)
STC 6000	6,136 (23,230)	909 (3,440)	687 (19,453)
STC 7200	7,420 (28,090)	1,059 (4,010)	839 (23,757)
STC 11000	11,194 (42,370)	2,797 (10, 590)	1,086 (30,752)
STC 13000	13,348 (50,530)	2,797 (10, 590)	1,374 (38,907)
STC 16000	15,918 (60,260)	3,055 (11, 560)	1,677 (47,487)

NOTE: Storage volumes may vary slightly from region to region. For detailed information, contact your local Stormceptor representative.

4.2. Inline Stormceptor

The Inline Stormceptor, Figure 1, is the standard design for most stormwater treatment applications. The patented Stormceptor design allows the Inline unit to maintain continuous positive treatment of total suspended solids (TSS) year-round, regardless of flow rate. The Inline Stormceptor is composed of a precast concrete tank with a fiberglass insert situated at the invert of the storm sewer pipe, creating an upper chamber above the insert and a lower chamber below the insert.

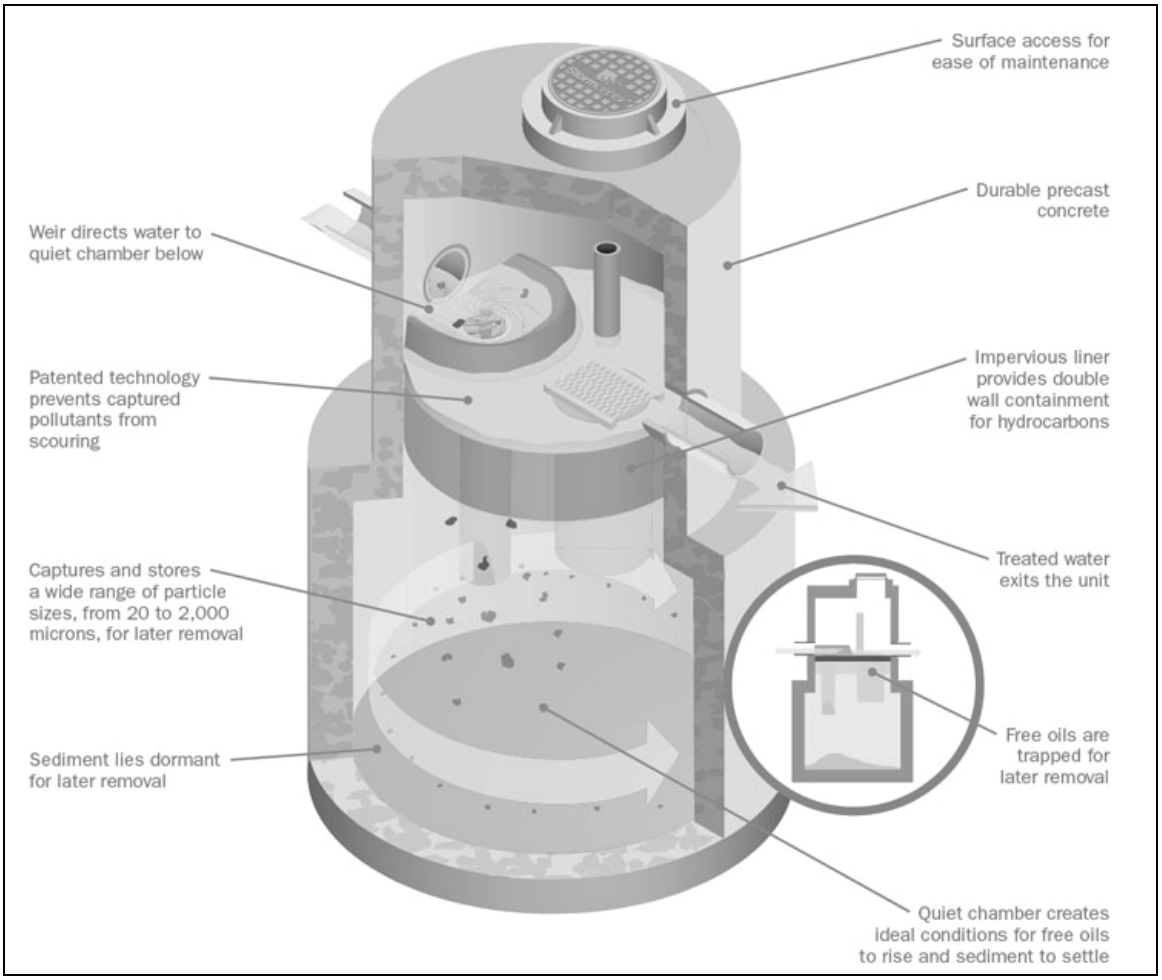


Figure 1. Inline Stormceptor

Operation

As water flows into the Stormceptor unit, it is slowed and directed to the lower chamber by a weir and drop tee. The stormwater enters the lower chamber, a non-turbulent environment, allowing free oils to rise and sediment to settle. The oil is captured underneath the fiberglass insert and shielded from exposure to the concrete walls by a fiberglass skirt. After the pollutants separate, treated water continues up a riser pipe, and exits the lower chamber on the downstream side of the weir before leaving the unit. During high flow events, the Stormceptor System's patented scour prevention technology ensures continuous pollutant removal and prevents re-suspension of previously captured pollutants.

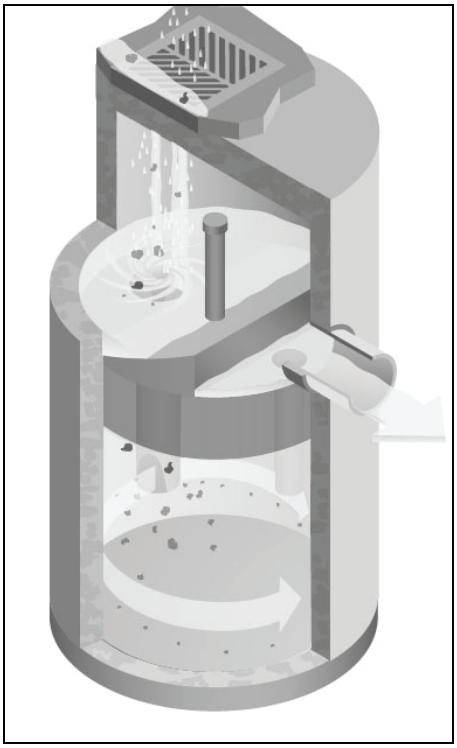


Figure 2. Inlet Stormceptor

4.3. Inlet Stormceptor

The Inlet Stormceptor System, Figure 2, was designed to provide protection for parking lots, loading bays, gas stations and other spill-prone areas. The Inlet Stormceptor is designed to remove sediment from stormwater introduced through a grated inlet, a storm sewer pipe, or both.

The Inlet Stormceptor design operates in the same manner as the Inline unit, providing continuous positive treatment, and ensuring that captured material is not re-suspended.

4.4. Series Stormceptor

Designed to treat larger drainage areas, the Series Stormceptor System, Figure 3, consists of two adjacent Stormceptor models that function in parallel. This design eliminates the need for additional structures and piping to reduce installation costs.



Figure 3. Series System

The Series Stormceptor design operates in the same manner as the Inline unit, providing continuous positive treatment, and ensuring that captured material is not re-suspended.

5. Sizing the Stormceptor System

The Stormceptor System is a versatile product that can be used for many different aspects of water quality improvement. While addressing these needs, there are conditions that the designer needs to be aware of in order to size the Stormceptor model to meet the demands of each individual site in an efficient and cost-effective manner.

PCSWMM for Stormceptor is the support tool used for identifying the appropriate Stormceptor model. In order to size a unit, it is recommended the user follow the seven design steps in the program. The steps are as follows:

STEP 1 – Project Details

The first step prior to sizing the Stormceptor System is to clearly identify the water quality objective for the development. It is recommended that a level of annual sediment (TSS) removal be identified and defined by a particle size distribution.

STEP 2 – Site Details

Identify the site development by the drainage area and the level of imperviousness. It is recommended that imperviousness be calculated based on the actual area of imperviousness based on paved surfaces, sidewalks and rooftops.

STEP 3 – Upstream Attenuation

The Stormceptor System is designed as a water quality device and is sometimes used in conjunction with onsite water quantity control devices such as ponds or underground detention systems. When possible, a greater benefit is typically achieved when installing a Stormceptor unit upstream of a detention facility. By placing the Stormceptor unit upstream of a detention structure, a benefit of less maintenance of the detention facility is realized.

STEP 4 – Particle Size Distribution

It is critical that the PSD be defined as part of the water quality objective. PSD is critical for the design of treatment system for a unit process of gravity settling and governs the size of a treatment system. A range of particle sizes has been provided and it is recommended that clays and silt-sized particles be considered in addition to sand and gravel-sized particles. Options and sample PSDs are provided in PCSWMM for Stormceptor. The default particle size distribution is the Fine Distribution, Table 2, option.

Table 2. Fine Distribution

Particle Size	Distribution	Specific Gravity
20	20%	1.3
60	20%	1.8
150	20%	2.2
400	20%	2.65
2000	20%	2.65

If the objective is the long-term removal of 80% of the total suspended solids on a given site, the PSD should be representative of the expected sediment on the site. For example, a system designed to remove 80% of coarse particles (greater than 75 microns) would provide relatively poor removal efficiency of finer particles that may be naturally prevalent in runoff from the site.

Since the small particle fraction contributes a disproportionately large amount of the total available particle surface area for pollutant adsorption, a system designed primarily for coarse particle capture will compromise water quality objectives.

STEP 5 – Rainfall Records

Local historical rainfall has been acquired from the U.S. National Oceanic and Atmospheric Administration, Environment Canada and regulatory agencies across North America. The rainfall data provided with PCSMM for Stormceptor provides an accurate estimation of small storm hydrology by modeling actual historical storm events including duration, intensities and peaks.

STEP 6 – Summary

At this point, the program may be executed to predict the level of TSS removal from the site. Once the simulation has completed, a table shall be generated identifying the TSS removal of each Stormceptor unit.

STEP 7 – Sizing Summary

Performance estimates of all Stormceptor units for the given site parameters will be displayed in a tabular format. The unit that meets the water quality objective, identified in Step 1, will be highlighted.

5.1. PCSWMM for Stormceptor

The Stormceptor System has been developed in conjunction with PCSWMM for Stormceptor as a technological solution to achieve water quality goals. Together, these two innovations model, simulate, predict and calculate the water quality objectives desired by a design engineer for TSS removal.

PCSWMM for Stormceptor is a proprietary sizing program which uses site specific inputs to a computer model to simulate sediment accumulation, hydrology and long-term total suspended solids removal. The model has been calibrated to field monitoring results from Stormceptor units that have been monitored in North America. The sizing methodology can be described by three processes:

1. Determination of real time hydrology
2. Buildup and wash off of TSS from impervious land areas
3. TSS transport through the Stormceptor (settling and discharge). The use of a calibrated model is the preferred method for sizing stormwater quality structures for the following reasons:
    - » The hydrology of the local area is properly and accurately incorporated in the sizing (distribution of flows, flow rate ranges and peaks, back-to-back storms, inter-event times)
    - » The distribution of TSS with the hydrology is properly and accurately considered in the sizing
    - » Particle size distribution is properly considered in the sizing
    - » The sizing can be optimized for TSS removal
    - » The cost benefit of alternate TSS removal criteria can be easily assessed
    - » The program assesses the performance of all Stormceptor models. Sizing may be selected based on a specific water quality outcome or based on the Maximum Extent Practicable

For more information regarding PCSWMM for Stormceptor, contact your local Stormceptor representative, or visit www.imbriumsystems.com to download a free copy of the program.

5.2. Sediment Loading Characteristics

The way in which sediment is transferred to stormwater can have a considerable effect on which type of system is implemented. On typical impervious surfaces (e.g. parking lots) sediment will build over time and wash off with the next rainfall. When rainfall patterns are examined, a short intense storm will have a higher concentration of sediment than a long slow drizzle. Together with rainfall data representing the site's typical rainfall patterns, sediment loading characteristics play a part in the correct sizing of a stormwater quality device.

Typical Sites

For standard site design of the Stormceptor System, PCSWMM for Stormceptor is utilized to accurately assess the unit's performance. As an integral part of the product's design, the program can be used to meet local requirements for total suspended solid removal. Typical installations of manufactured stormwater treatment devices would occur on areas such as paved parking lots or paved roads. These are considered "stable" surfaces which have non – erodible surfaces.

Unstable Sites

While standard sites consist of stable concrete or asphalt surfaces, sites such as gravel parking lots, or maintenance yards with stockpiles of sediment would be classified as "unstable". These types of sites do not exhibit first flush characteristics, are highly erodible and exhibit atypical sediment loading characteristics and must therefore be sized more carefully. Contact your local Stormceptor representative for assistance in selecting a proper unit sized for such unstable sites.

6. Spill Controls

When considering the removal of total petroleum hydrocarbons (TPH) from a storm sewer system there are two functions of the system: oil removal, and spill capture.

'Oil Removal' describes the capture of the minute volumes of free oil mobilized from impervious surfaces. In this instance relatively low concentrations, volumes and flow rates are considered. While the Stormceptor unit will still provide an appreciable oil removal function during higher flow events and/or with higher TPH concentrations, desired effluent limits may be exceeded under these conditions.

'Spill Capture' describes a manner of TPH removal more appropriate to recovery of a relatively high volume of a single phase deleterious liquid that is introduced to the storm sewer system over a relatively short duration. The two design criteria involved when considering this manner of introduction are overall volume and the specific gravity of the material. A standard Stormceptor unit will be able to capture and retain a maximum spill volume and a minimum specific gravity.

For spill characteristics that fall outside these limits, unit modifications are required. Contact your local Stormceptor Representative for more information.

One of the key features of the Stormceptor technology is its ability to capture and retain spills. While the standard Stormceptor System provides excellent protection for spill control, there are additional options to enhance spill protection if desired.

6.1. Oil Level Alarm

The oil level alarm is an electronic monitoring system designed to trigger a visual and audible alarm when a pre-set level of oil is reached within the lower chamber. As a standard, the oil

level alarm is designed to trigger at approximately 85% of the unit's available depth level for oil capture. The feature acts as a safeguard against spills caused by exceeding the oil storage capacity of the separator and eliminates the need for manual oil level inspection.

The oil level alarm installed on the Stormceptor insert is illustrated in Figure 4.

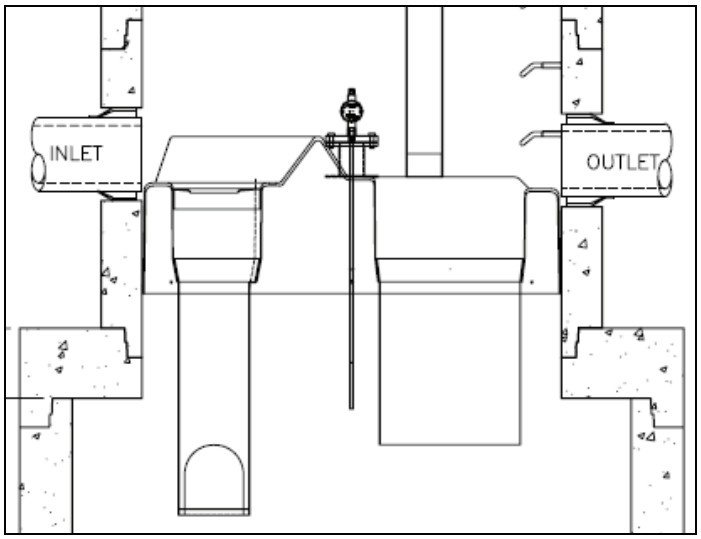


Figure 4. Oil level alarm

6.2. Increased Volume Storage Capacity

The Stormceptor unit may be modified to store a greater spill volume than is typically available. Under such a scenario, instead of installing a larger than required unit, modifications can be made to the recommended Stormceptor model to accommodate larger volumes. Contact your local Stormceptor representative for additional information and assistance for modifications.

7. Stormceptor Options

The Stormceptor System allows flexibility to incorporate to existing and new storm drainage infrastructure. The following section identifies considerations that should be reviewed when installing the system into a drainage network. For conditions that fall outside of the recommendations in this section, please contact your local Stormceptor representative for further guidance.

7.1. Installation Depth Minimum Cover

The minimum distance from the top of grade to the crown of the inlet pipe is 24 inches (600 mm). For situations that have a lower minimum distance, contact your local Stormceptor representative.

7.2. Maximum Inlet and Outlet Pipe Diameters

Maximum inlet and outlet pipe diameters are illustrated in Figure 5. Contact your local Stormceptor representative for larger pipe diameters

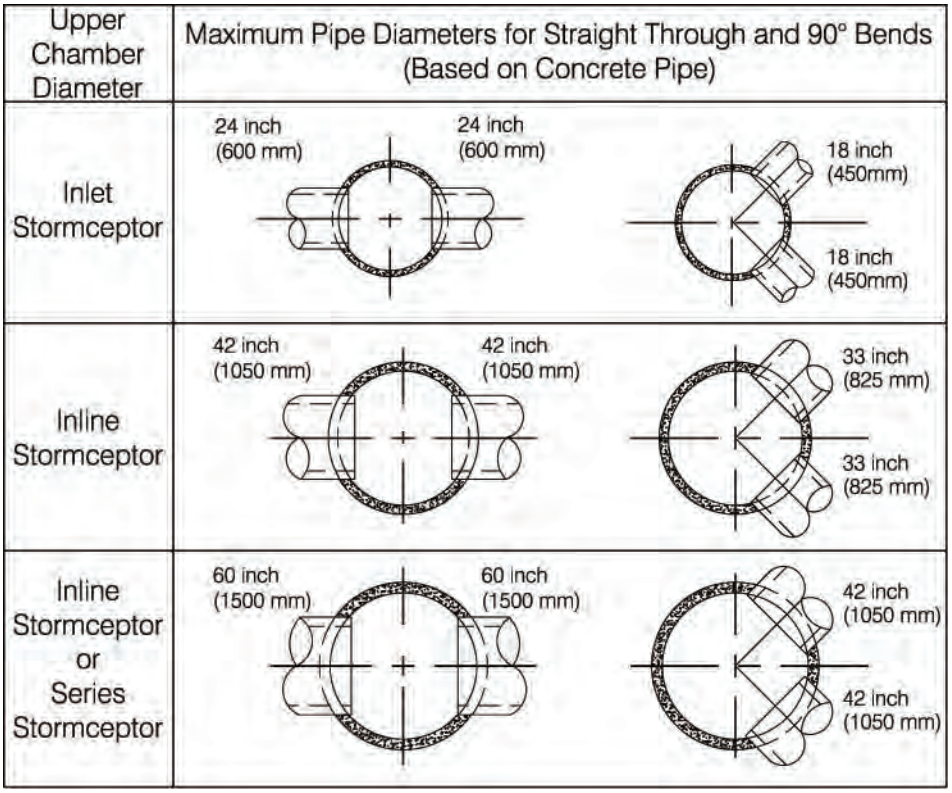


Figure 5. Maximum pipe diameters for straight through and bend applications

***The bend should only be incorporated into the second structure (downstream structure) of the Series Stormceptor System

7.3. Bends

The Stormceptor System can be used to change horizontal alignment in the storm drain network up to a maximum of 90 degrees. Figure 6 illustrates the typical bend situations of the Stormceptor System. Bends should only be applied to the second structure (downstream structure) of the Series Stormceptor System.

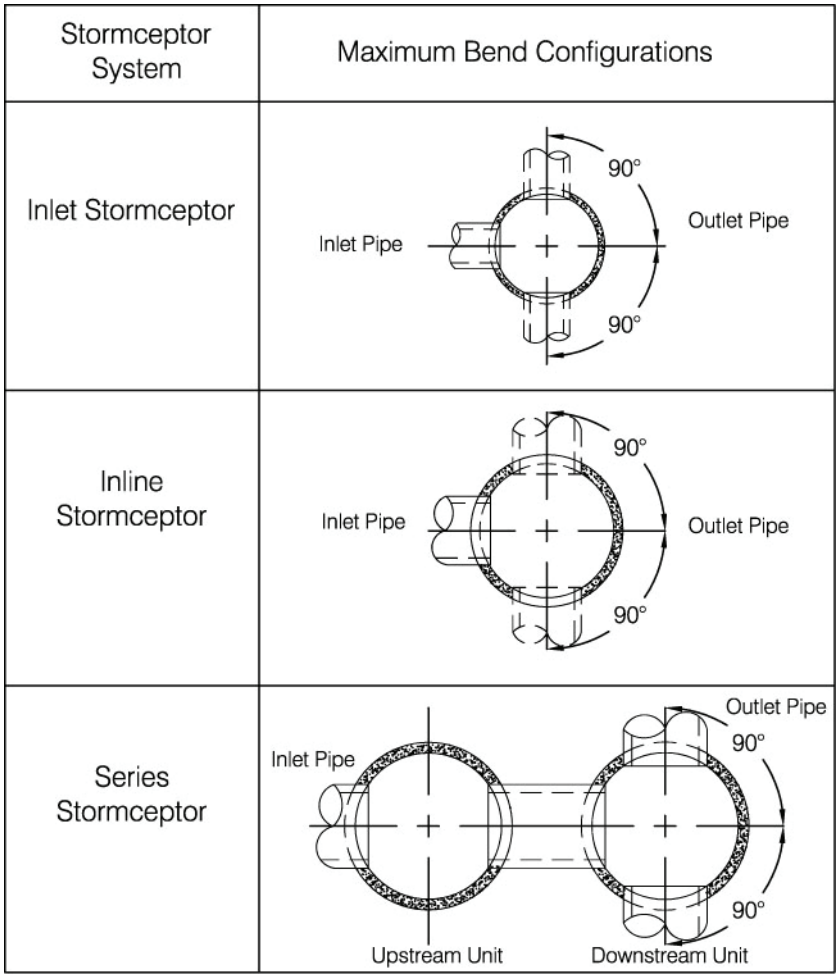


Figure 6. Maximum bend angles

7.4. Multiple Inlet Pipes

The Inlet and Inline Stormceptor System can accommodate two or more inlet pipes. The maximum number of inlet pipes that can be accommodated into a Stormceptor unit is a function of the number, alignment and diameter of the pipes and its effects on the structural integrity of the precast concrete. When multiple inlet pipes are used for new developments, each inlet pipe shall have an invert elevation 3 inches (75 mm) higher than the outlet pipe invert elevation.

7.5. Inlet/Outlet Pipe Invert Elevations

Recommended inlet and outlet pipe invert differences are listed in Table 3.

Table 3. Recommended Drops Between Inlet and Outlet Pipe Inverts

Number of Inlet Pipes	Inlet System	In-Line System	Series System
1	3 inches (75 mm)	1 inch (25 mm)	3 inches (75 mm)
>1	3 inches (75 mm)	3 inches (75 mm)	Not Applicable

7.6. Shallow Stormceptor

In cases where there may be restrictions to the depth of burial of storm sewer systems. In this situation, for selected Stormceptor models, the lower chamber components may be increased in diameter to reduce the overall depth of excavation required.

7.7. Customized Live Load

The Stormceptor system is typically designed for local highway truck loading (AASHTO HS- 20). When the project requires live loads greater than HS-20, the Stormceptor System may be customized structurally for a pre-specified live load. Contact your local Stormceptor representative for customized loading conditions.

7.8. Pre-treatment

The Stormceptor System may be sized to remove sediment and for spills control in conjunction with other stormwater BMPs to meet the water quality objective. For pretreatment applications, the Stormceptor System should be the first unit in a treatment train. The benefits of pre-treatment include the extension of the operational life (extension of maintenance frequency) of large stormwater management facilities, prevention of spills and lower total life- cycle maintenance cost.

7.9. Head loss

The head loss through the Stormceptor System is similar to a 60 degree bend at a manhole. The K value for calculating minor losses is approximately 1.3 (minor loss = k*1.3v2/2g).

However, when a Submerged modification is applied to a Stormceptor unit, the corresponding K value is 4.

7.10. Submerged

The Submerged modification, Figure 7, allows the Stormceptor System to operate in submerged or partially submerged storm sewers. This configuration can be installed on all models of the Stormceptor System by modifying the fiberglass insert. A customized weir height and a secondary drop tee are added.

Submerged instances are defined as standing water in the storm drain system during zero flow conditions. In these instances, the following information is necessary for the proper design and application of submerged modifications:

- Stormceptor top of grade elevation
- Stormceptor outlet pipe invert elevation
- Standing water elevation

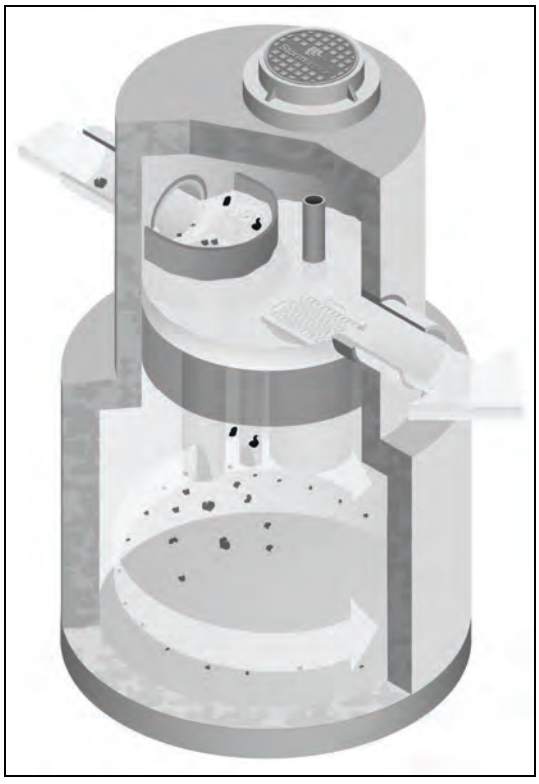


Figure 7. Submerged Stormceptor

8. Comparing Technologies

Designers have many choices available to achieve water quality goals in the treatment of stormwater runoff. Since many alternatives are available for use in stormwater quality treatment it is important to consider how to make an appropriate comparison between "approved alternatives". The following is a guide to assist with the accurate comparison of differing technologies and performance claims.

8.1. Particle Size Distribution (PSD)

The most sensitive parameter to the design of a stormwater quality device is the selection of the design particle size. While it is recommended that the actual particle size distribution (PSD) for sites be measured prior to sizing, alternative values for particle size should be selected to represent what is likely to occur naturally on the site. A reasonable estimate of a particle size distribution likely to be found on parking lots or other impervious surfaces should consist of a wide range of particles such as 20 microns to 2,000 microns (Ontario MOE, 1994).

There is no absolute right particle size distribution or specific gravity and the user is cautioned to review the site location, characteristics, material handling practices and regulatory requirements when selecting a particle size distribution. When comparing technologies, designs using different PSDs will result in incomparable TSS removal efficiencies. The PSD of the TSS removed needs to be standard between two products to allow for an accurate comparison.

8.2. Scour Prevention

In order to accurately predict the performance of a manufactured treatment device, there must be confidence that it will perform under all conditions. Since rainfall patterns cannot be predicted, stormwater quality devices placed in storm sewer systems must be able to withstand extreme events, and ensure that all pollutants previously captured are retained in the system.

In order to have confidence in a system's performance under extreme conditions, independent validation of scour prevention is essential when examining different technologies. Lack of independent verification of scour prevention should make a designer wary of accepting any product's performance claims.

8.3. Hydraulics

Full scale laboratory testing has been used to confirm the hydraulics of the Stormceptor System. Results of lab testing have been used to physically design the Stormceptor System and the sewer pipes entering and leaving the unit. Key benefits of Stormceptor are:

- Low head loss (typical k value of 1.3)
- Minimal inlet/outlet invert elevation drop across the structure
- Use as a bend structure
- Accommodates multiple inlets

The adaptability of the treatment device to the storm sewer design infrastructure can affect the overall performance and cost of the site.

8.4. Hydrology

Stormwater quality treatment technologies need to perform under varying climatic conditions. These can vary from long low intensity rainfall to short duration, high intensity storms. Since a treatment device is expected to perform under all these conditions, it makes sense that any system's design should accommodate those conditions as well.

Long-term continuous simulation evaluates the performance of a technology under the varying conditions expected in the climate of the subject site. Single, peak event design does not provide this information and is not equivalent to long-term simulation. Designers should request long-term simulation performance to ensure the technology can meet the long-term water quality objective.

9. Testing

The Stormceptor System has been the most widely monitored stormwater treatment technology in the world. Performance verification and monitoring programs are completed to the strictest standards and integrity. Since its introduction in 1990, numerous independent field tests and studies detailing the effectiveness of the Stormceptor System have been completed.

- Coventry University, UK – 97% removal of oil, 83% removal of sand and 73% removal of peat
- National Water Research Institute, Canada, - scaled testing for the development of the Stormceptor System identifying both TSS removal and scour prevention.
- New Jersey TARP Program – full scale testing of an STC 900 demonstrating 75% TSS removal of particles from 1 to 1000 microns. Scour testing completed demonstrated that the system does not scour. The New Jersey Department of Environmental Protection was followed.
- City of Indianapolis – full scale testing of an STC 900 demonstrating over 80% TSS removal of particles from 50 microns to 300 microns at 130% of the unit's operating rate. Scour testing completed demonstrated that the system does not scour.
- Westwood Massachusetts (1997), demonstrated >80% TSS removal
- Como Park (1997), demonstrated 76% TSS removal
- Ontario MOE SWAMP Program – 57% removal of 1 to 25 micron particles
- Laval Quebec – 50% removal of 1 to 25 micron particles

10. Installation

The installation of the concrete Stormceptor should conform in general to state highway, or local specifications for the installation of manholes. Selected sections of a general specification that are applicable are summarized in the following sections.

10.1. Excavation

Excavation for the installation of the Stormceptor should conform to state highway, or local specifications. Topsoil removed during the excavation for the Stormceptor should be stockpiled in designated areas and should not be mixed with subsoil or other materials.

Topsoil stockpiles and the general site preparation for the installation of the Stormceptor should conform to state highway or local specifications.

The Stormceptor should not be installed on frozen ground. Excavation should extend a minimum of 12 inches (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

In areas with a high water table, continuous dewatering may be required to ensure that the excavation is stable and free of water.

10.2. Backfilling

Backfill material should conform to state highway or local specifications. Backfill material should be placed in uniform layers not exceeding 12 inches (300mm) in depth and compacted to state highway or local specifications.

11. Stormceptor Construction Sequence

The concrete Stormceptor is installed in sections in the following sequence:

1. Aggregate base
2. Base slab
3. Lower chamber sections
4. Upper chamber section with fiberglass insert
5. Connect inlet and outlet pipes
6. Assembly of fiberglass insert components (drop tee, riser pipe, oil cleanout port and orifice plate
7. Remainder of upper chamber
8. Frame and access cover

The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

Adjustment of the Stormceptor can be performed by lifting the upper sections free of the excavated area, re-leveling the base and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary. Once the Stormceptor has been constructed, any lift holes must be plugged with mortar.

12. Maintenance

12.1. Health and Safety

The Stormceptor System has been designed considering safety first. It is recommended that confined space entry protocols be followed if entry to the unit is required. In addition, the fiberglass insert has the following health and safety features:

- Designed to withstand the weight of personnel
- A safety grate is located over the 24 inch (600 mm) riser pipe opening
- Ladder rungs can be provided for entry into the unit, if required

12.2. Maintenance Procedures

Maintenance of the Stormceptor system is performed using vacuum trucks. No entry into the unit is required for maintenance (in most cases). The vacuum service industry is a well- established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean a Stormceptor will vary based on the size of unit and transportation distances.

The need for maintenance can be determined easily by inspecting the unit from the surface. The depth of oil in the unit can be determined by inserting a dipstick in the oil inspection/cleanout port.

Similarly, the depth of sediment can be measured from the surface without entry into the Stormceptor via a dipstick tube equipped with a ball valve. This tube would be inserted through the riser pipe. Maintenance should be performed once the sediment depth exceeds the guideline values provided in the Table 4.

Table 4. Sediment Depths Indicating Required Servicing*

Particle Size	Specific Gravity
Model	Sediment Depth inches (mm)
450i	8 (200)
900	8 (200)
1200	10 (250)
1800	15 (381)
2400	12 (300)
3600	17 (430)
4800	15 (380)
6000	18 (460)
7200	15 (381)
11000	17 (380)
13000	20 (500)
16000	17 (380)
* based on 15% of the Stormceptor unit's total storage	

Although annual servicing is recommended, the frequency of maintenance may need to be increased or reduced based on local conditions (i.e. if the unit is filling up with sediment more quickly than projected, maintenance may be required semi-annually; conversely once the site has stabilized maintenance may only be required every two or three years).

Oil is removed through the oil inspection/cleanout port and sediment is removed through the riser pipe. Alternatively oil could be removed from the 24 inches (600 mm) opening if water is removed from the lower chamber to lower the oil level below the drop pipes.

The following procedures should be taken when cleaning out Stormceptor:

1. Check for oil through the oil cleanout port
2. Remove any oil separately using a small portable pump
3. Decant the water from the unit to the sanitary sewer, if permitted by the local regulating authority, or into a separate containment tank
4. Remove the sludge from the bottom of the unit using the vacuum truck
5. Re-fill Stormceptor with water where required by the local jurisdiction

12.3. Submerged Stormceptor

Careful attention should be paid to maintenance of the Submerged Stormceptor System. In cases where the storm drain system is submerged, there is a requirement to plug both the inlet and outlet pipes to economically clean out the unit.

12.4. Hydrocarbon Spills

The Stormceptor is often installed in areas where the potential for spills is great. The Stormceptor System should be cleaned immediately after a spill occurs by a licensed liquid waste hauler.

12.5. Disposal

Requirements for the disposal of material from the Stormceptor System are similar to that of any other stormwater Best Management Practice (BMP) where permitted. Disposal options for the sediment may range from disposal in a sanitary trunk sewer upstream of a sewage treatment plant, to disposal in a sanitary landfill site. Petroleum waste products collected in the Stormceptor (free oil/chemical/fuel spills) should be removed by a licensed waste management company.

12.6. Oil Sheens

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (<10 mg/L). Stormceptor will remove over 98% of all free oil spills from storm sewer systems for dry weather or frequently occurring runoff events.

The appearance of a sheen at the outlet with high influent oil concentrations does not mean the unit is not working to this level of removal. In addition, if the influent oil is emulsified the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified conditions.



SUPPORT

Drawings and specifications are available at www.ContechES.com.

Site-specific design support is available from our engineers.

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FOR CULTEC STORMWATER MANAGEMENT SYSTEMS

CULTEC®

Proposal No. 608744-136412

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Contact Information:
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Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT057 11-23
November 2023

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

This manual contains guidelines recommended by CULTEC and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to deter mine if any sediment has accumulated in the inlet row.

B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.

1. Manhole Access
This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

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2. StormFilter Access
Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.

B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.

C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance
The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance
The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

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	Frequency	Action
Inlets and Outlets	Every 3 years	• Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	• Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	• Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	• Clean stormwater management chambers and feed connectors of any debris. • Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	• Clean stormwater management chambers and feed connectors of any debris. • Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. • Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. • Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. • Attain the appropriate approvals as required. • Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1st year	• Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	• Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	• Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC at 1-800-428-5832.

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WQMP
Operation & Maintenance (O&M) Plan

Project Name:_____

Prepared for:

Project Name: _____

Address:_____

City, State Zip:_____

Prepared on:

Date:_____

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This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

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Appendix ___

BMP SITE PLAN

Site plan is preferred on minimum 11” by 17” colored sheets, as long as legible.

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BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today's Date:_____

Name of Person Performing Activity (Printed):_____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

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Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Month 1	Date:	
□ Month 2	Date:	
□ Month 3	Date:	
□ Month 4	Date	
□ Month 5	Date:	
□ Month 6	Date:	
□ Month 7	Date:	
□ Month 8	Date:	
□ Month 9	Date:	
□ Month 10	Date:	
□ Month 11	Date:	
□ Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Year 1	Date:	
□ Year 4	Date:	
□ Year 7	Date:	
□ Year 10	Date:	
□ Year 13	Date:	
□ Year 16	Date:	
□ Year 19	Date:	
□ Year 22	Date:	

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Major Maintenance

	Frequency		Action
Inlets and Outlets	**Every 3 years**		Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
			Notes
	□ Year 1	Date:	
	□ Year 4	Date:	
	□ Year 7	Date:	
	□ Year 10	Date:	
	□ Year 13	Date:	
	□ Year 16	Date:	
	□ Year 19	Date:	
	□ Year 22	Date:	
	Spring and Fall		Check inlet and outlets for clogging and remove any debris, as required.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
CULTEC Stormwater Chambers	**2 years after commissioning**		□ Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
			Notes
	□ Year 2	Date:	

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.
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Major Maintenance

	Frequency		Action
CULTEC Stormwater Chambers	**9 years after commissioning every 9 years following**		□ Clean stormwater management chambers and feed connectors of any debris. □ Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
			Notes
	□ Year 9	Date:	
	□ Year 18	Date:	
	□ Year 27	Date:	
	□ Year 36	Date:	
	45 years after commissioning		□ Clean stormwater management chambers and feed connectors of any debris. □ Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. □ Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. □ Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. □ Attain the appropriate approvals as required. □ Establish a new operation and maintenance schedule.
			Notes
	□ Year 45	Date:	

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.
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Major Maintenance

	Frequency		Action
Surrounding Site	**Monthly in 1st year**		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Month 1	Date:	
	□ Month 2	Date:	
	□ Month 3	Date:	
	□ Month 4	Date:	
	□ Month 5	Date:	
	□ Month 6	Date:	
	□ Month 7	Date:	
	□ Month 8	Date:	
	□ Month 9	Date:	
	□ Month 10	Date:	
	□ Month 11	Date:	
	□ Month 12	Date:	
	Spring and Fall		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	Yearly		□ Confirm that no unauthorized modifications have been performed to the site.
			Notes
	□ Year 1	Date:	
	□ Year 2	Date:	
	□ Year 3	Date:	
	□ Year 4	Date:	
	□ Year 5	Date:	
	□ Year 6	Date:	
	□ Year 7	Date:	

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ATTACHMENT 4.10

Standard 10: Illicit Discharge Compliance Statement

Stormwater Report
Shank Painter Road and Route 6 Reconstruction
Provincetown, MA

ILLICIT DISCHARGE COMPLIANCE STATEMENT

To the best of my knowledge, there are no known illicit discharge connections to the existing drainage infrastructure in the project area on Route 6, Shank Painter Road, Court Street, or Bradford Street. Any illicit discharges identified prior to construction will be addressed immediately. No new illicit discharges are expected to occur as a result of this work.

I hereby certify that the preceding is accurate.

Maria George

Maria E. George, PE
Environmental Partners Group, Inc.

ATTACHMENT 5.1

Existing Flood Extent Figures

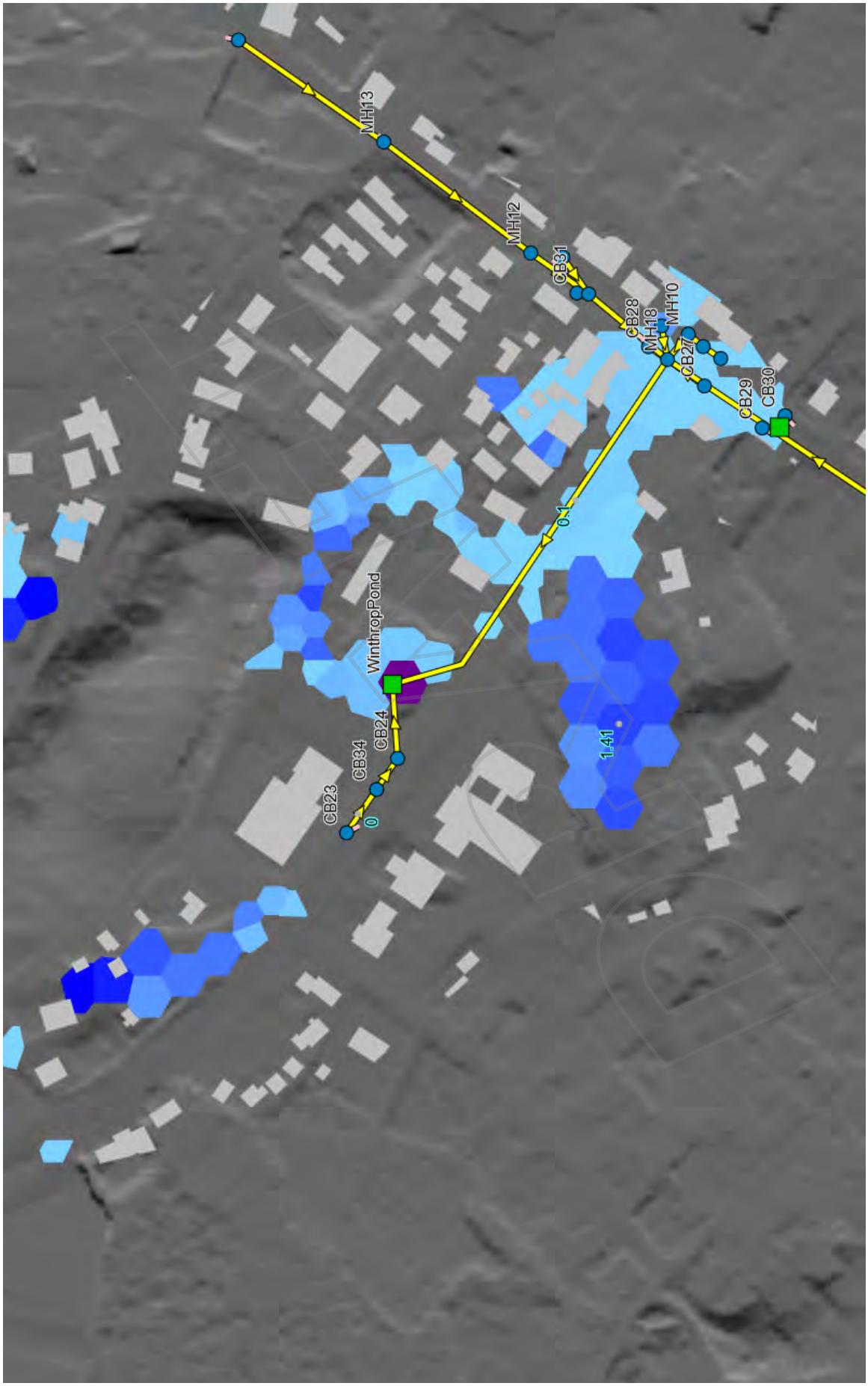


Figure 1: South Shank Painter

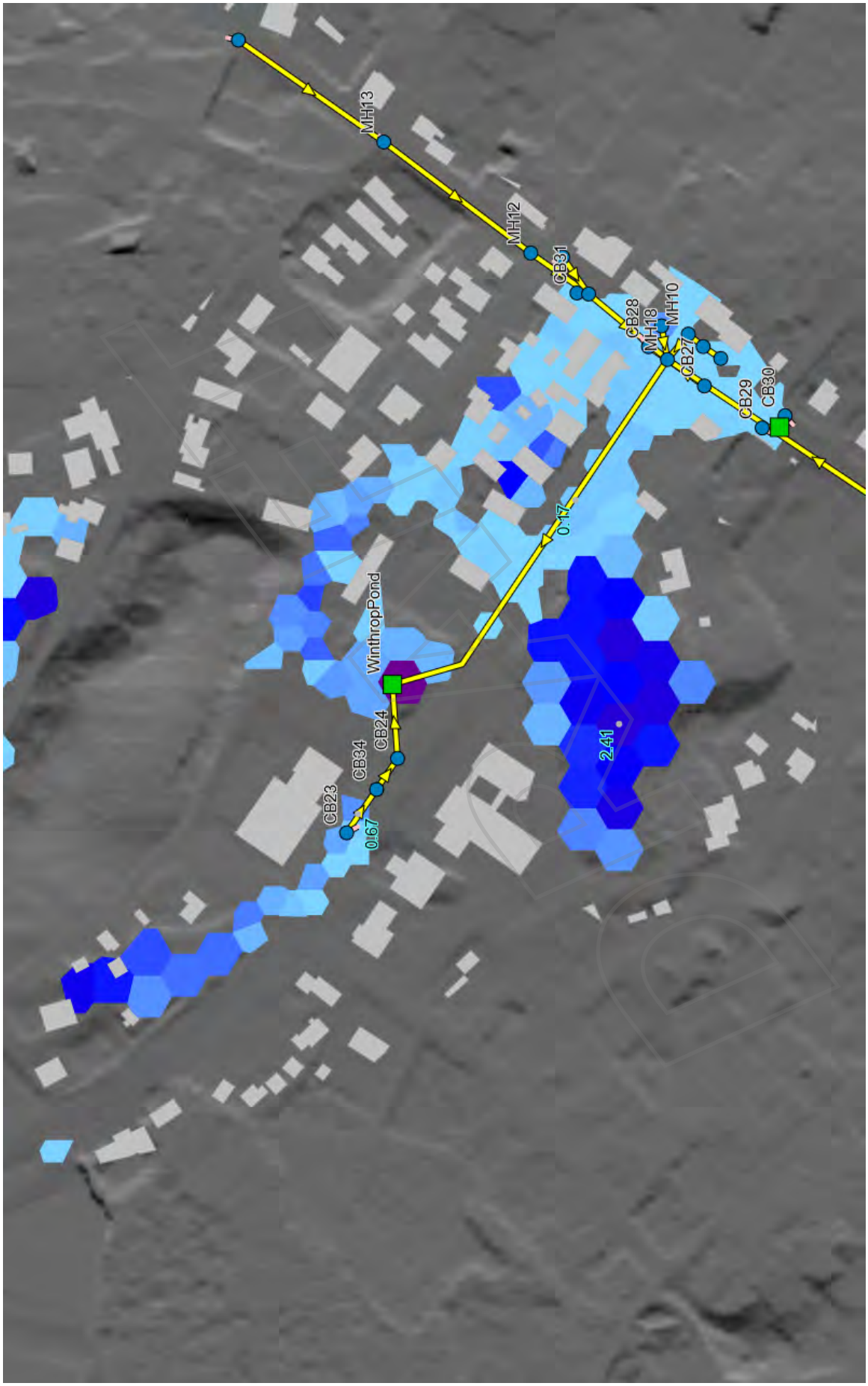


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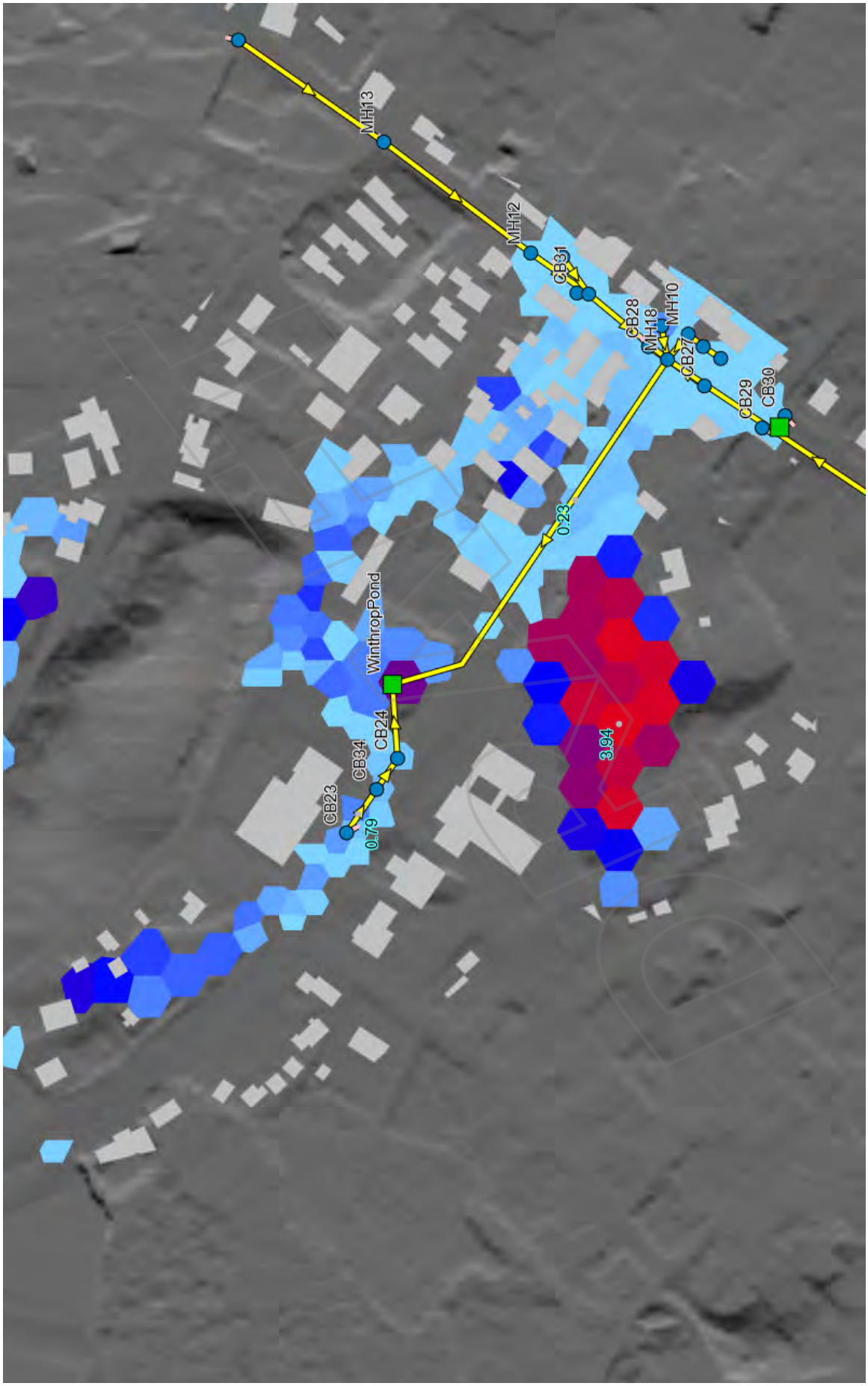


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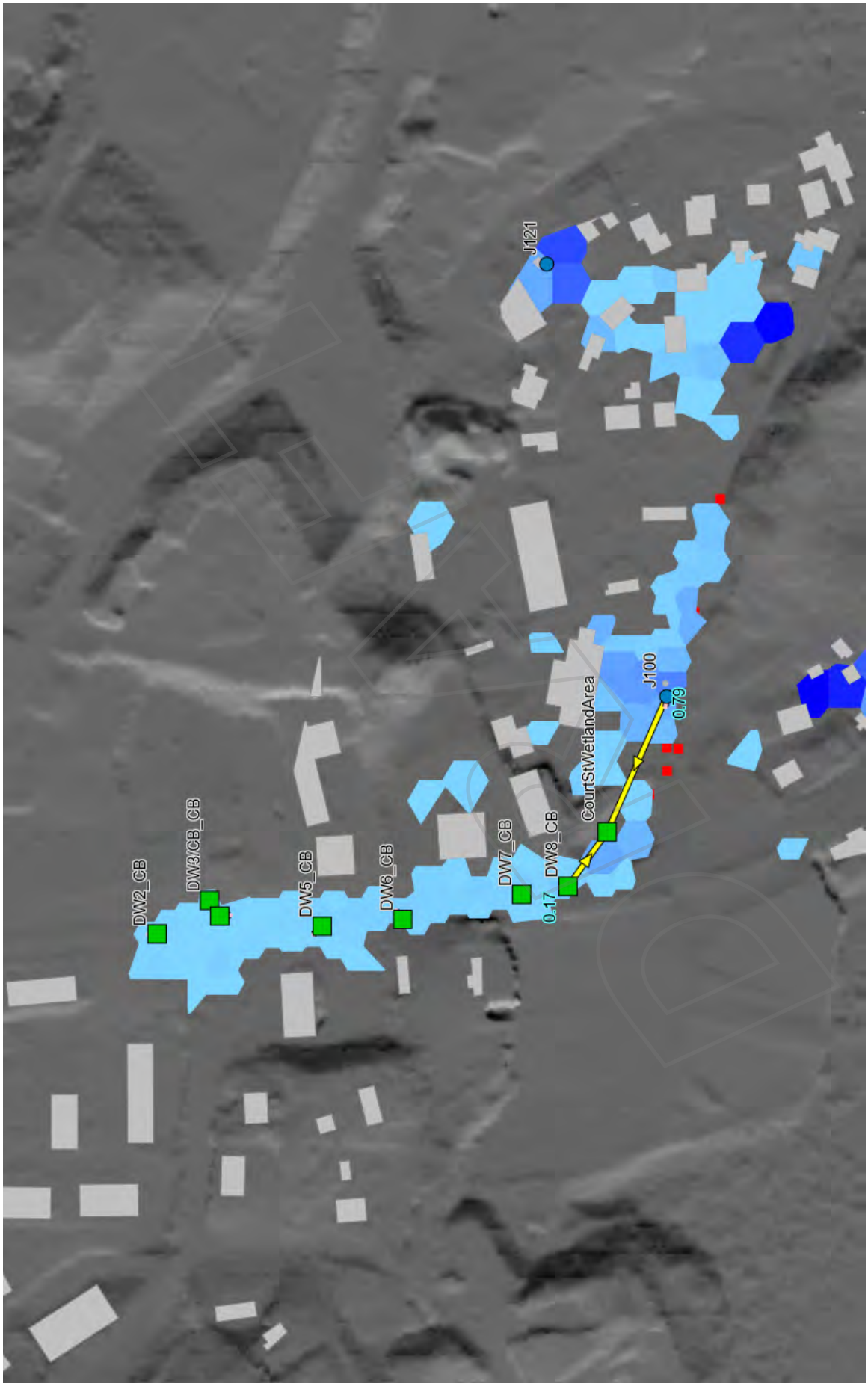


Figure 2: Court Street

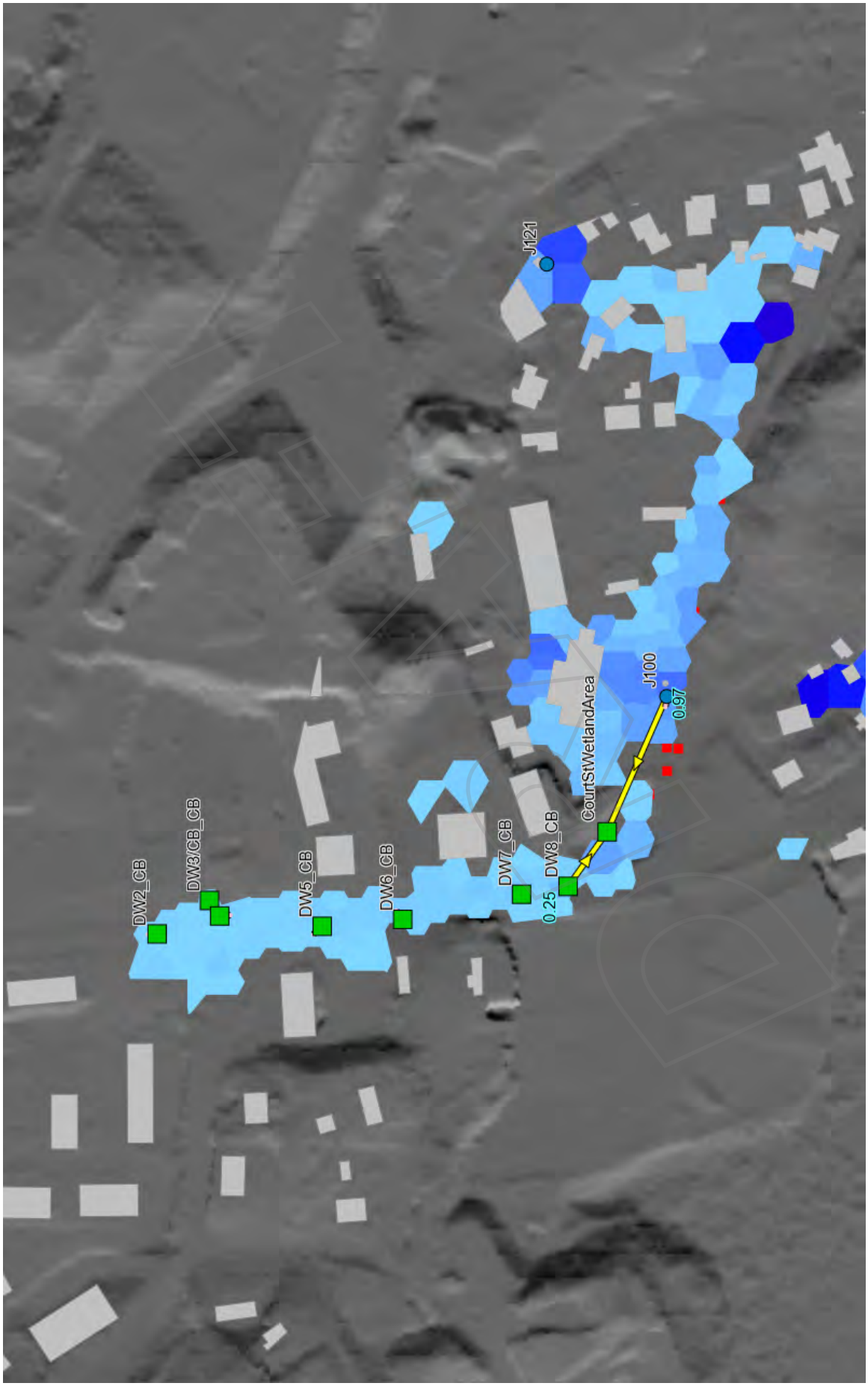


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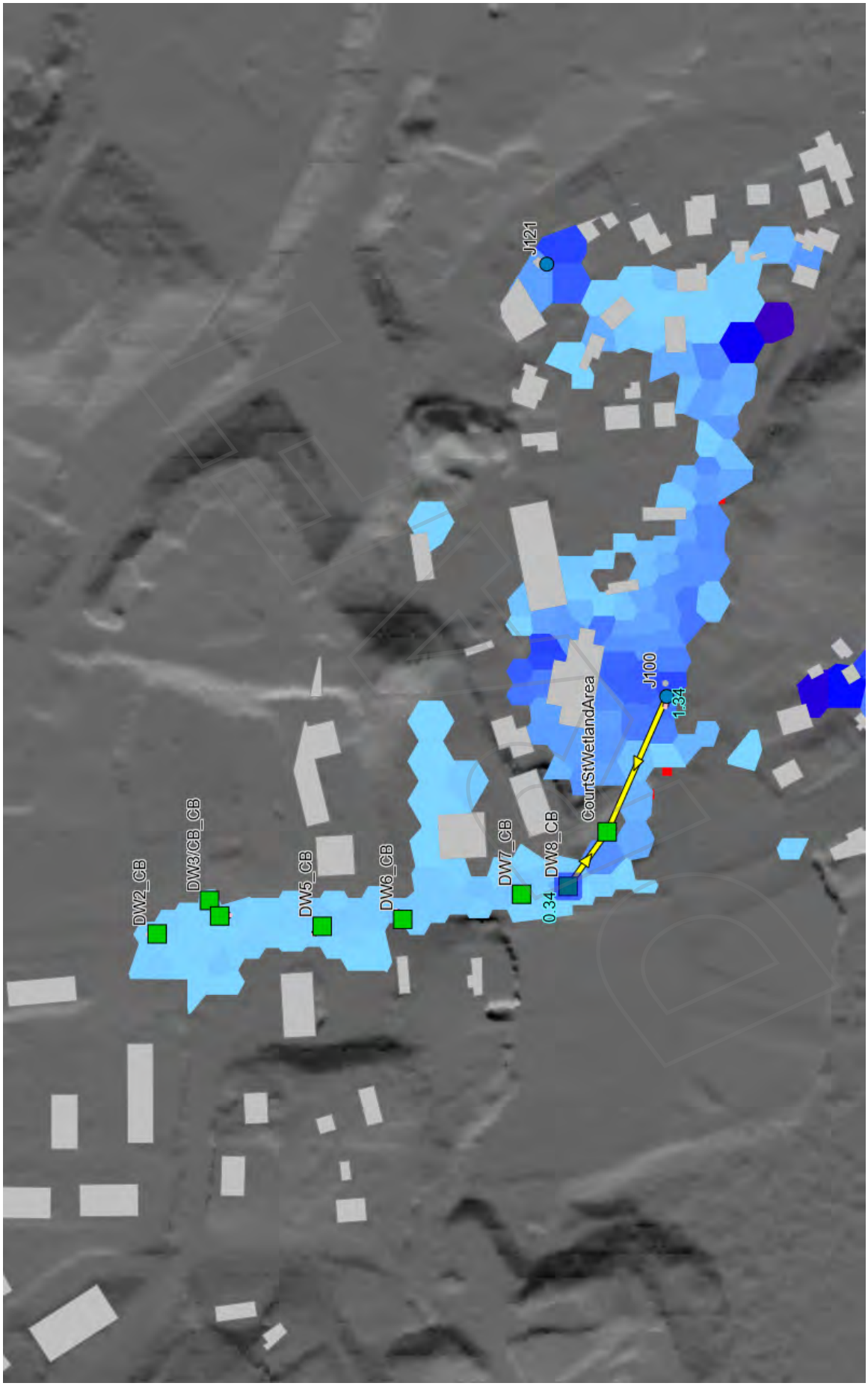


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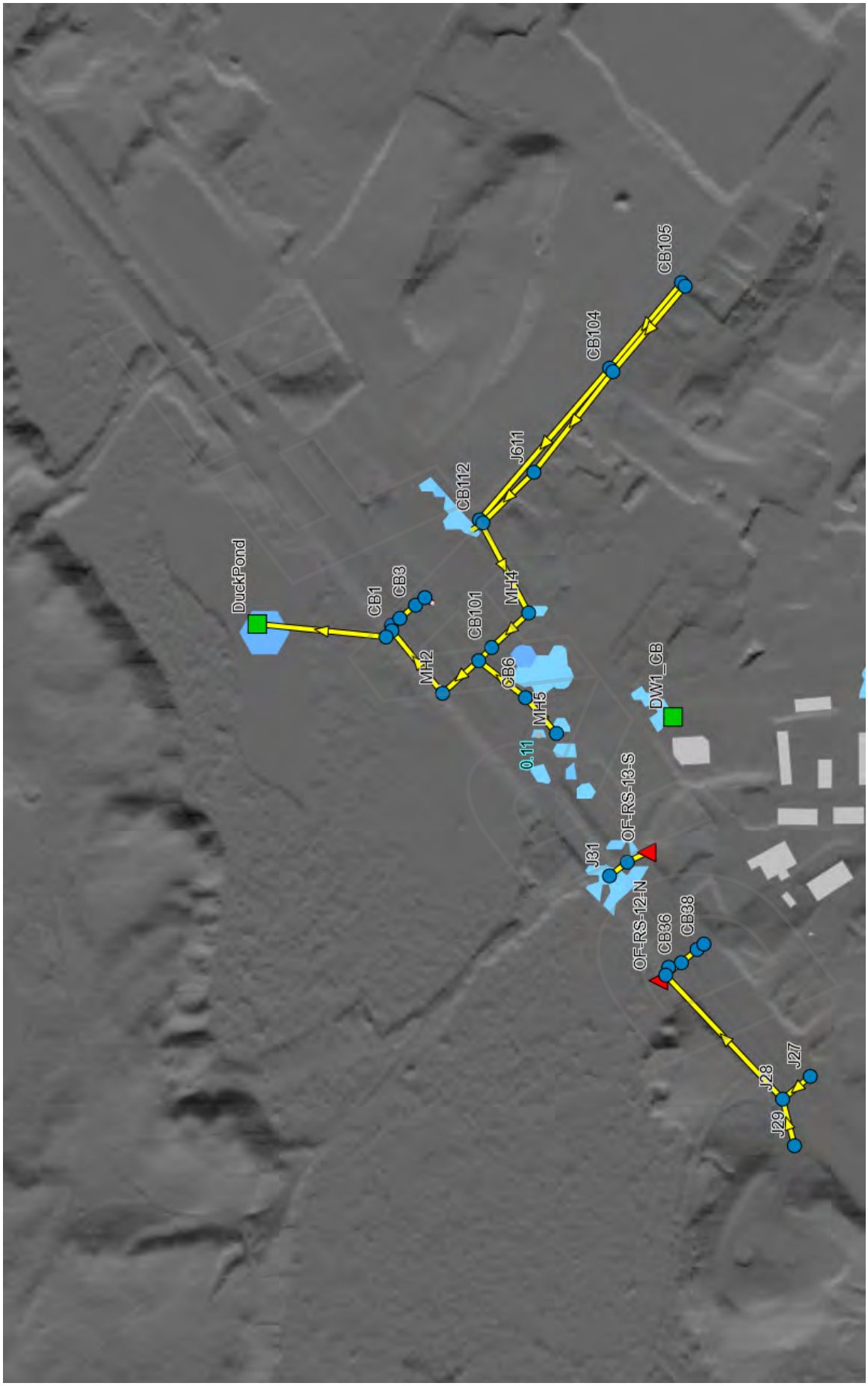


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

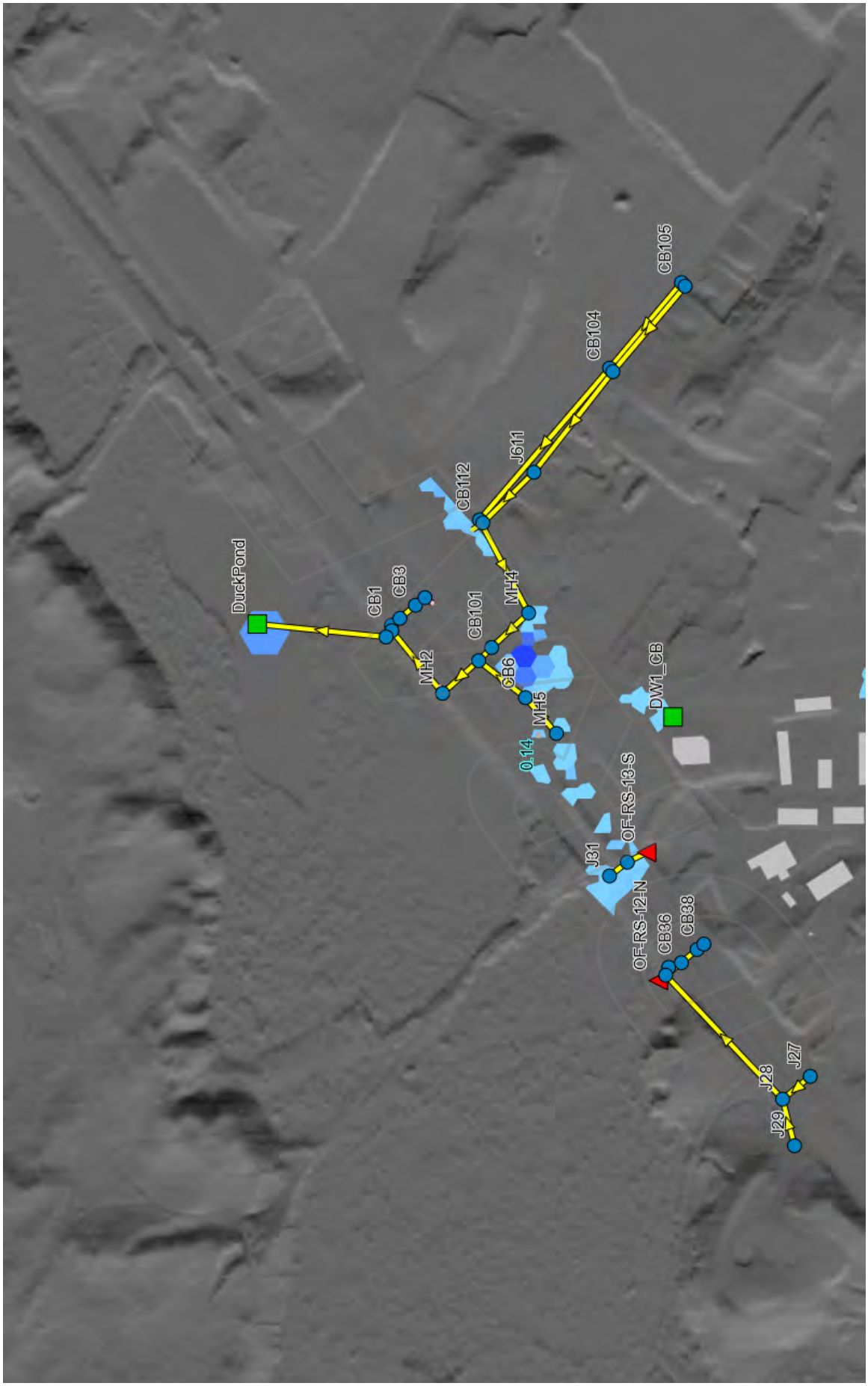


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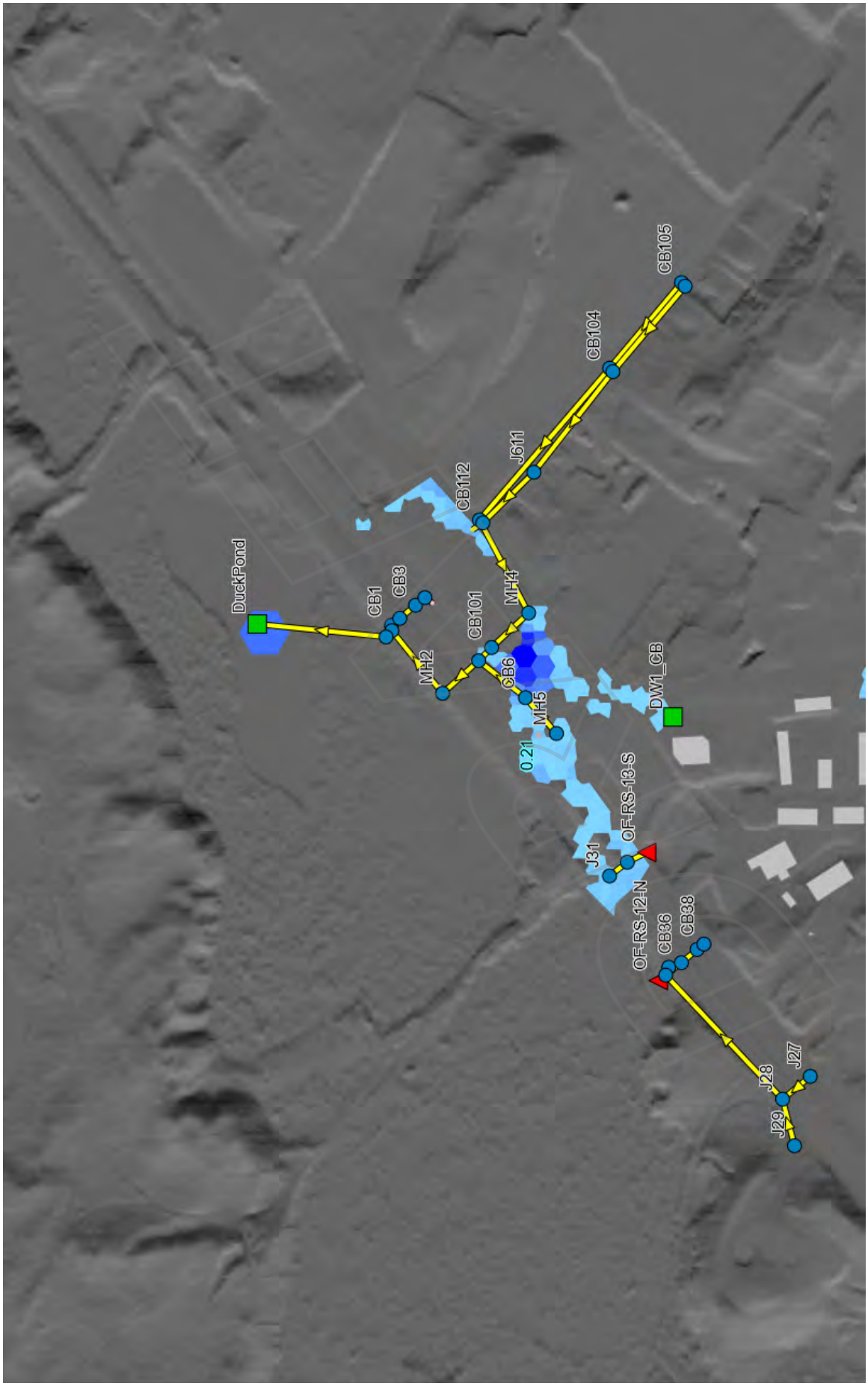


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

ATTACHMENT 5.2

Proposed Flood Extent Figures

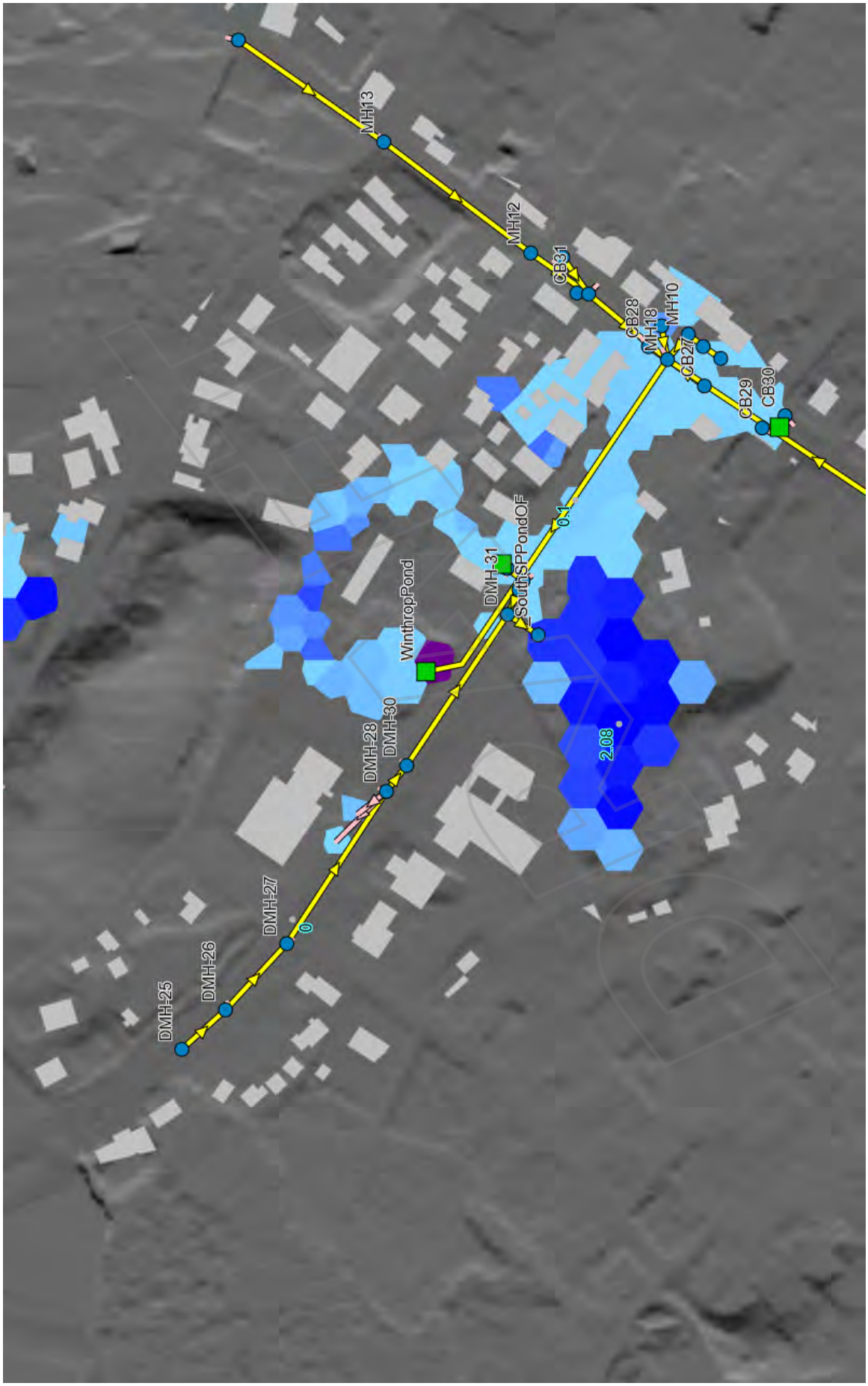


Figure 1: South Shank Painter

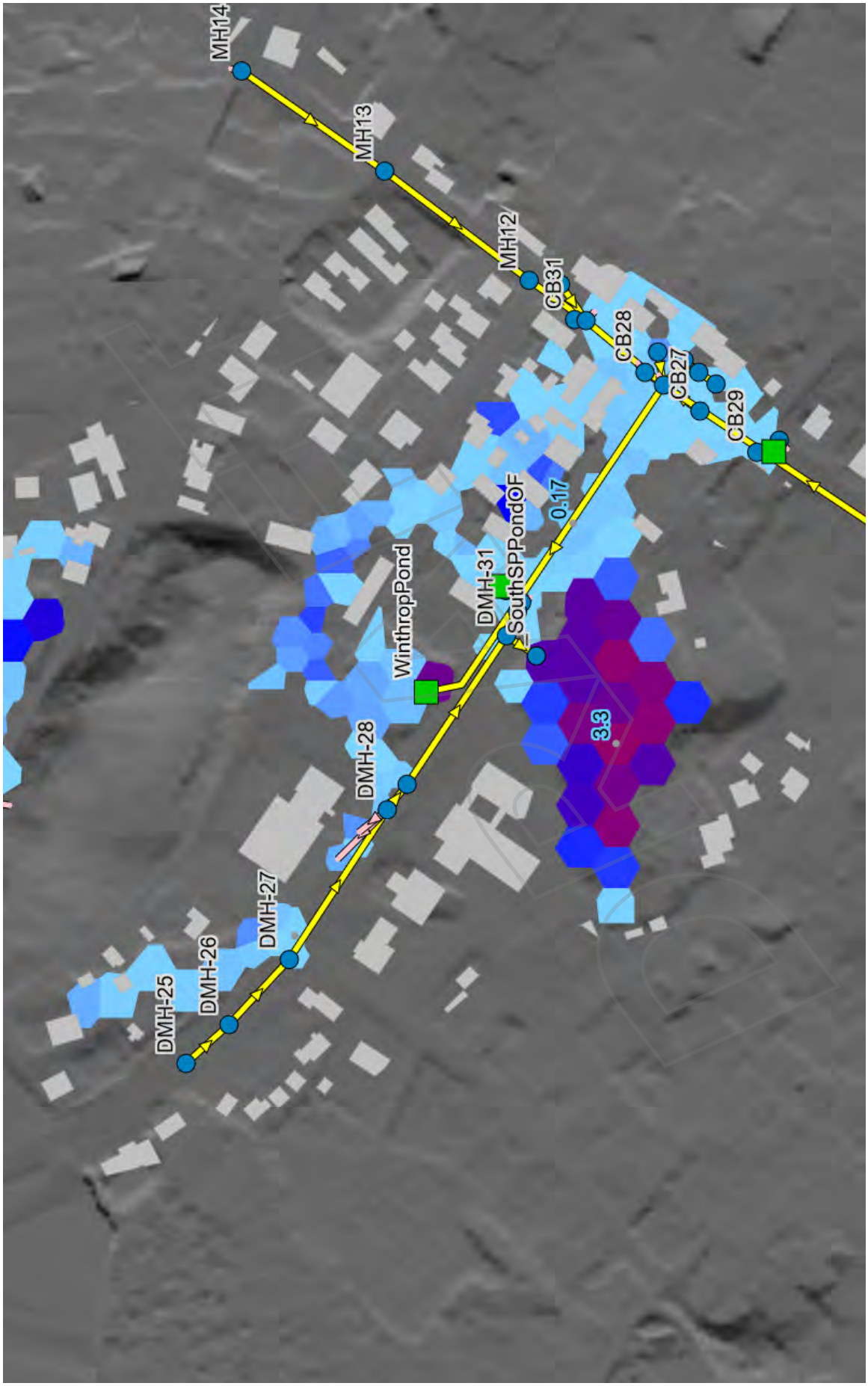


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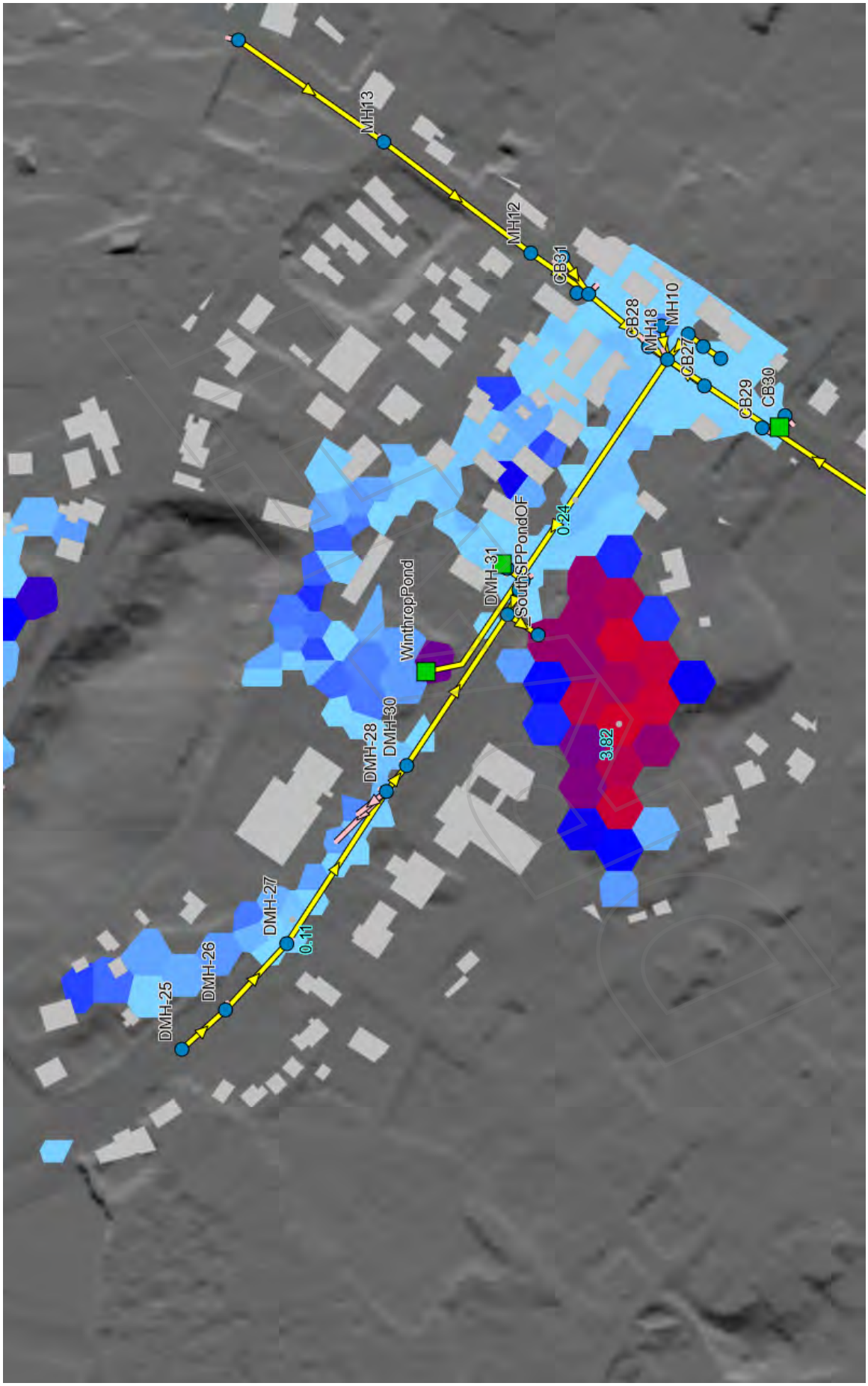


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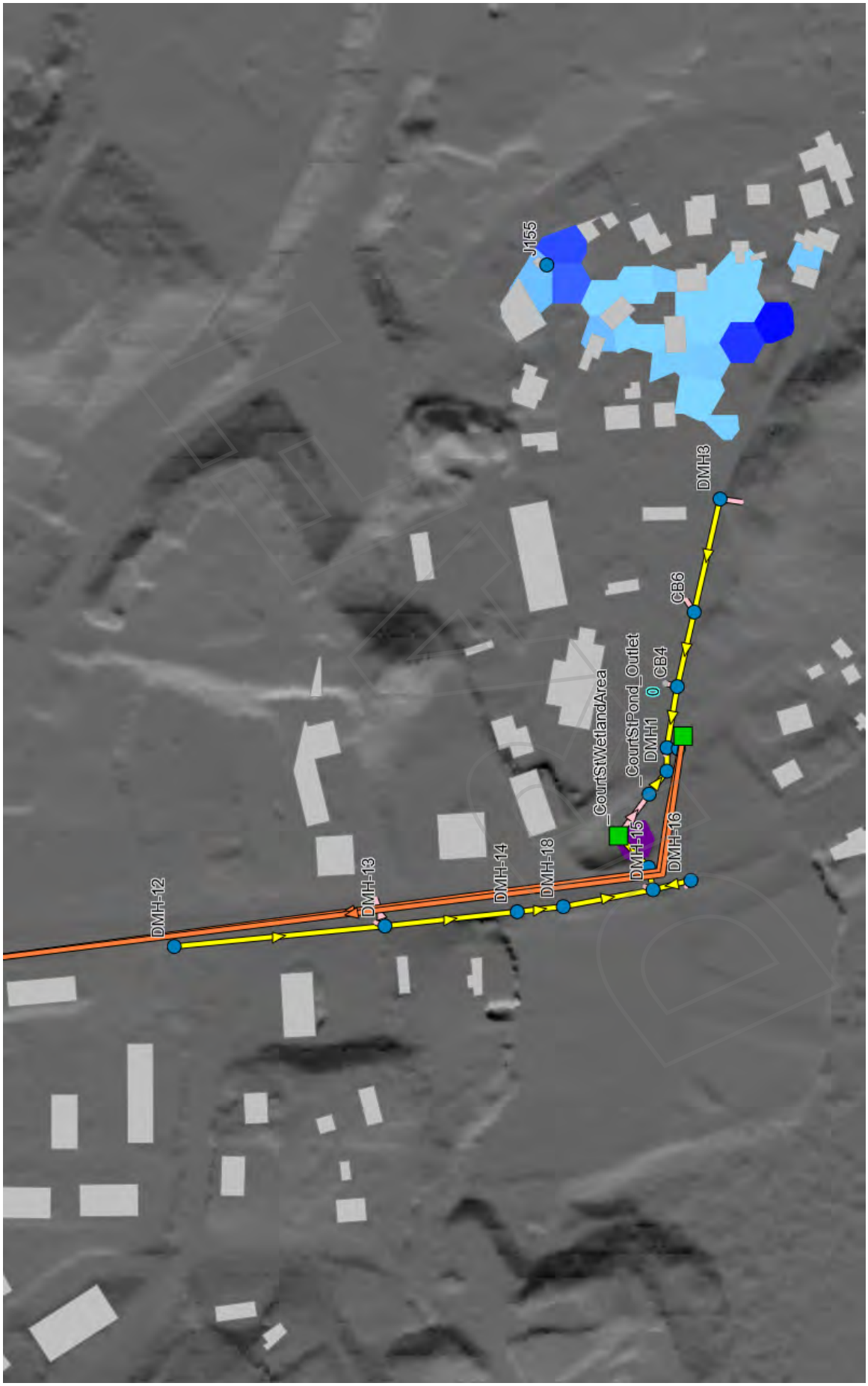


Figure 2: Court Street

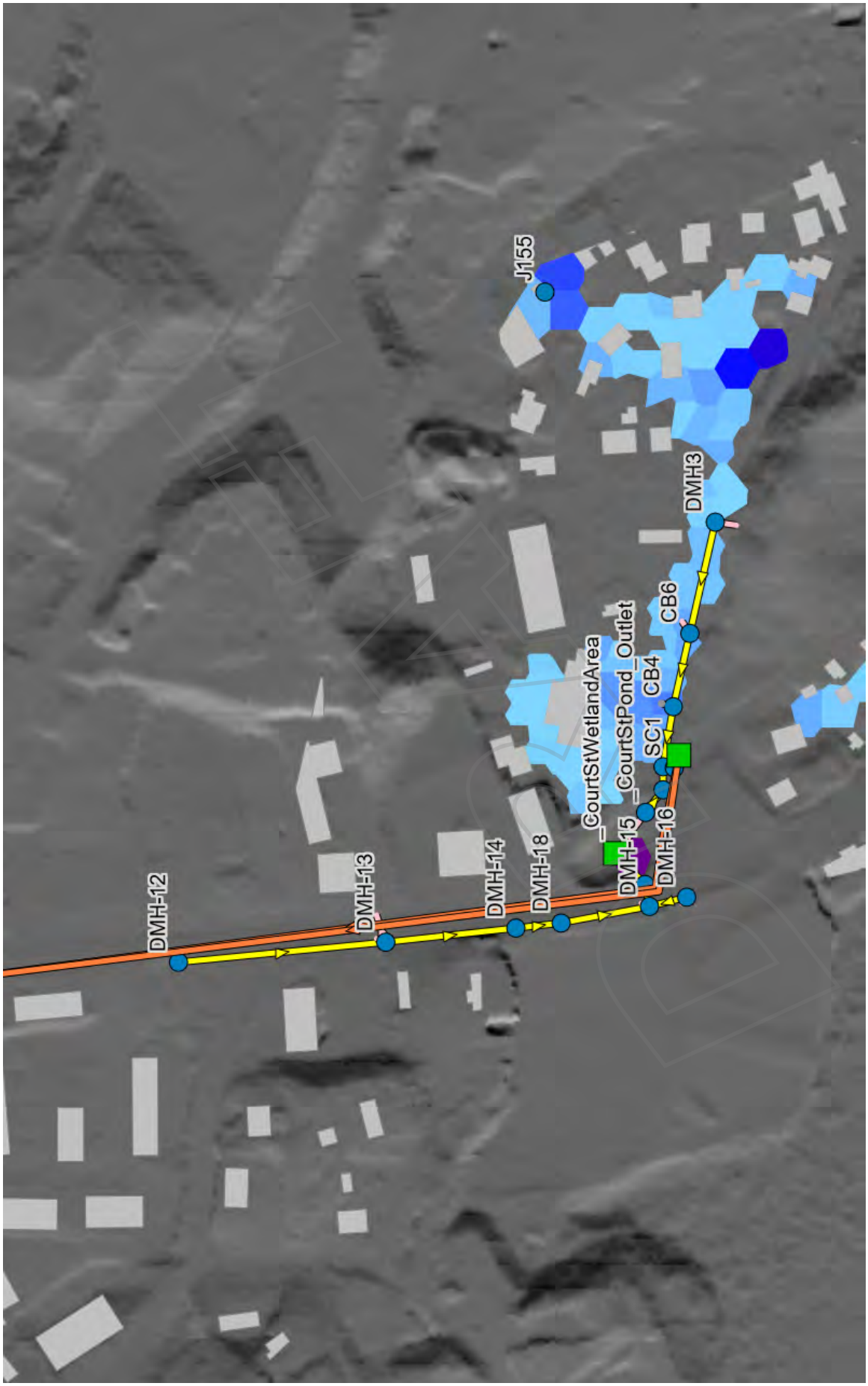


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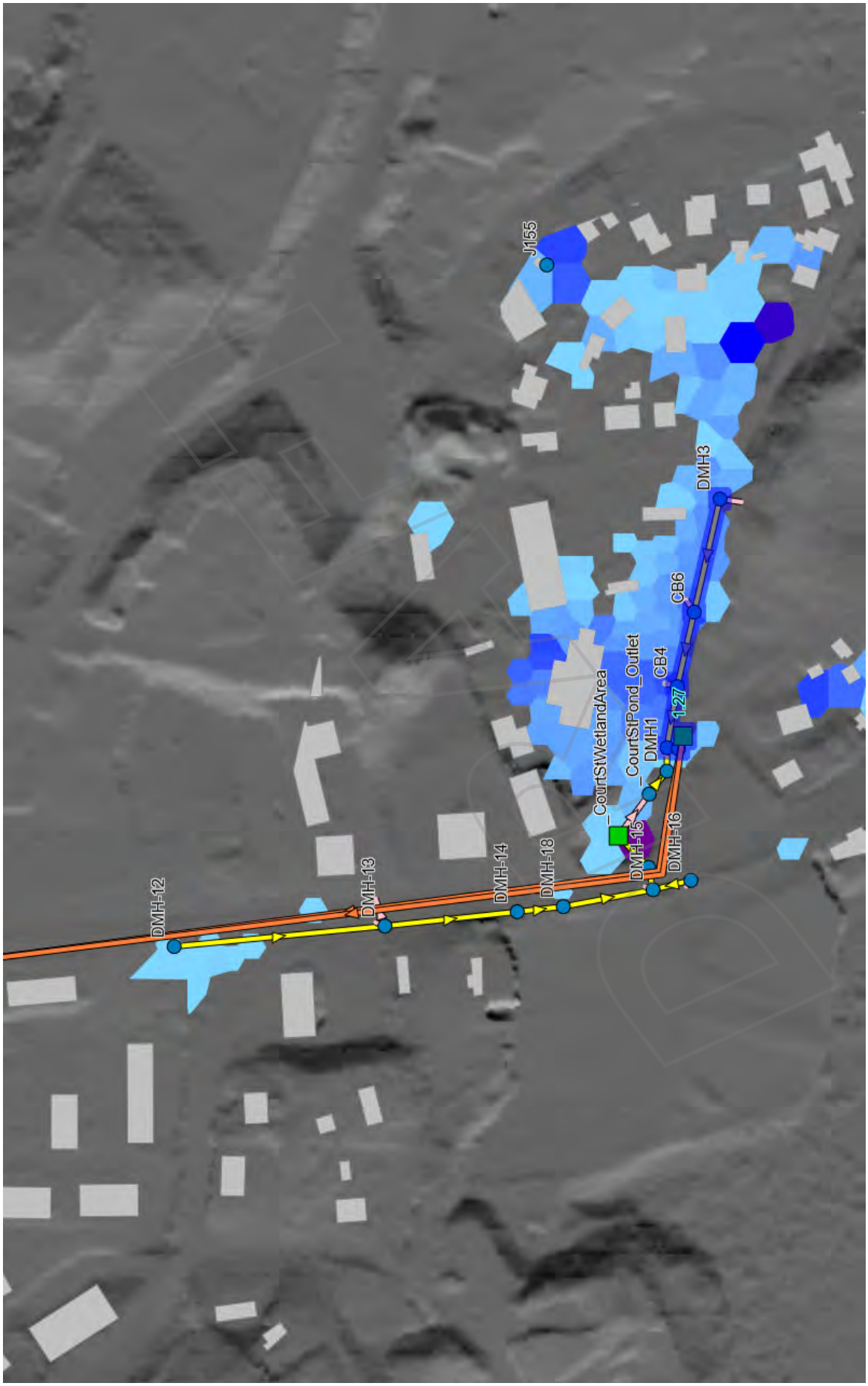


Figure 2: Court Street

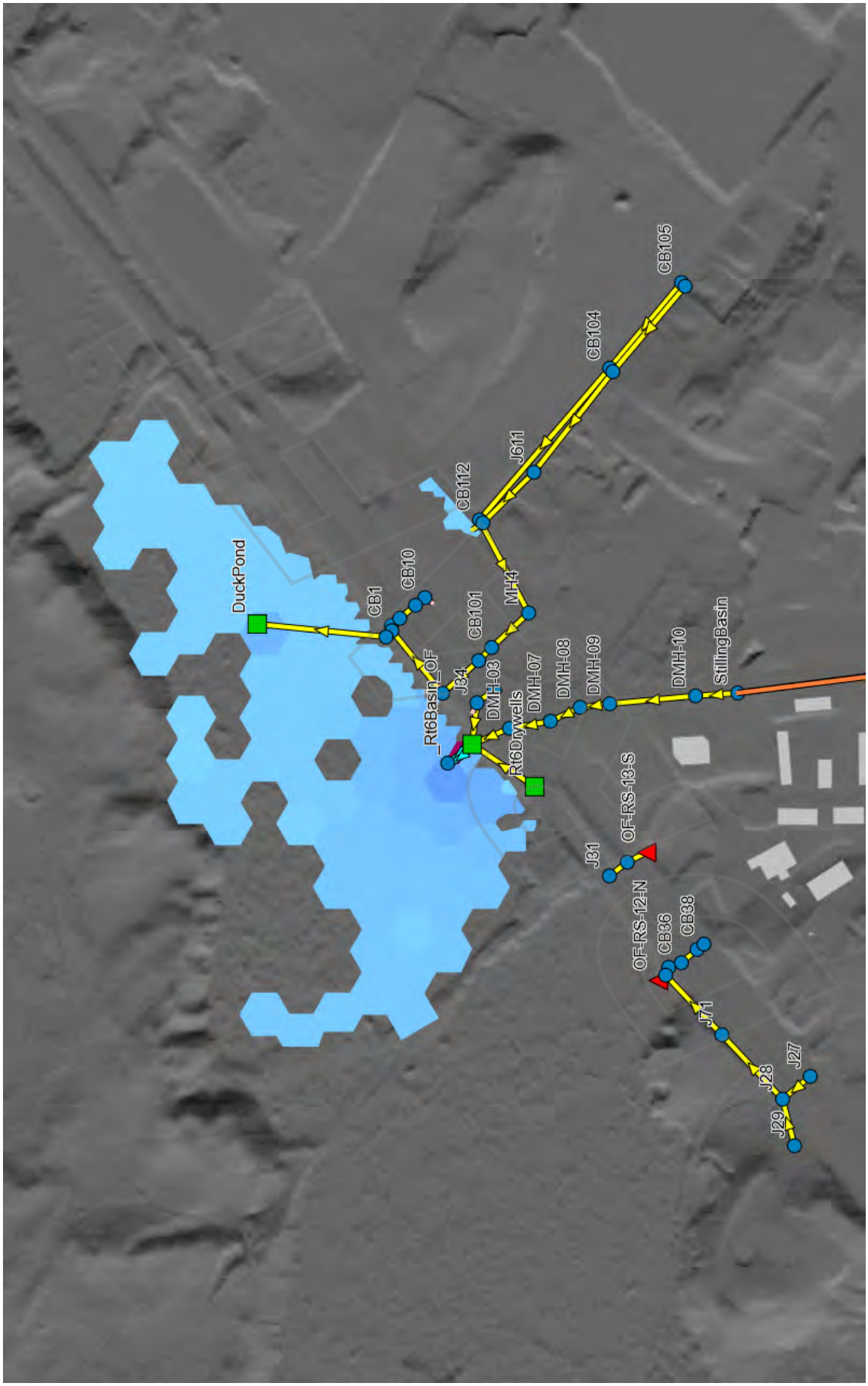


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

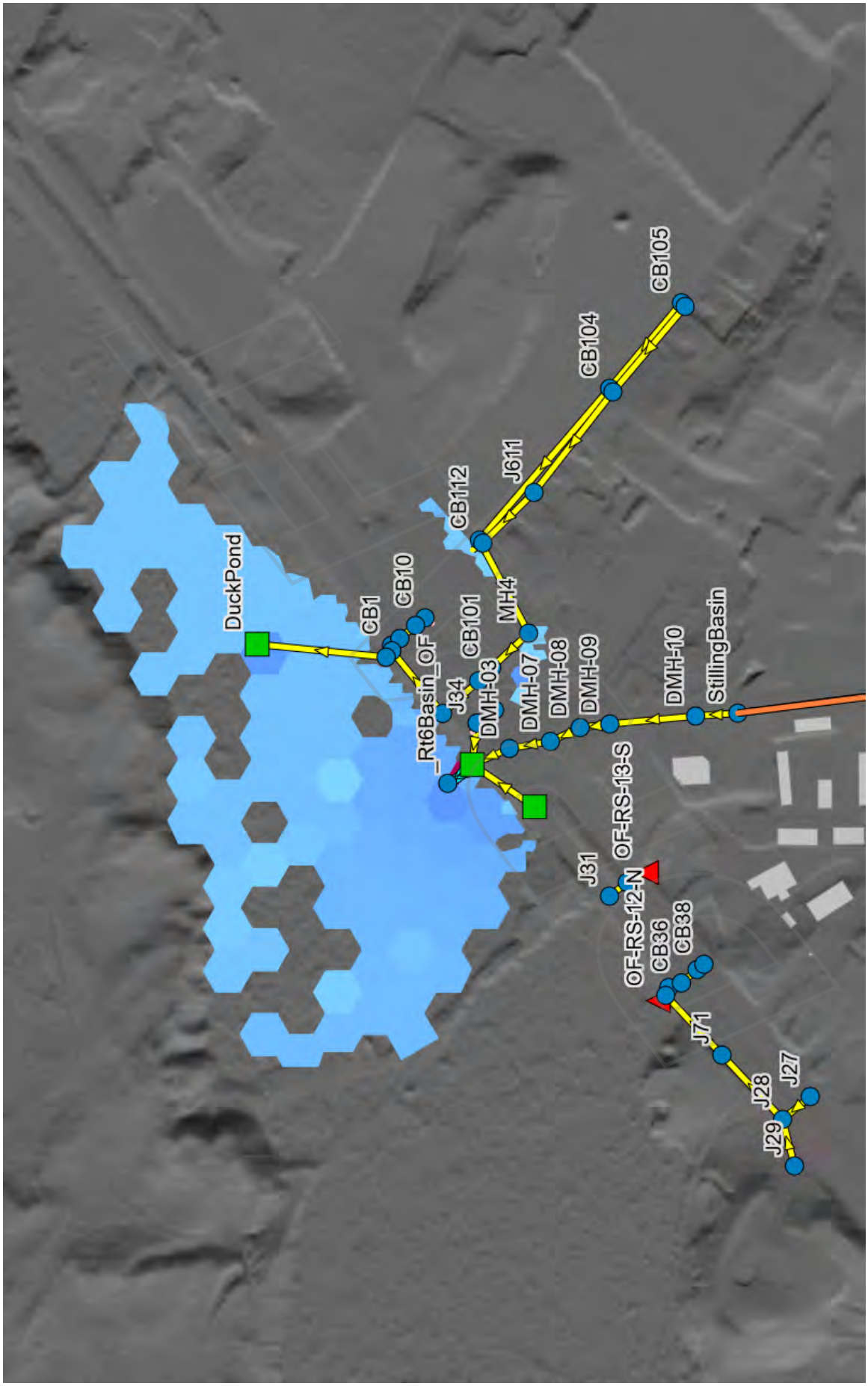


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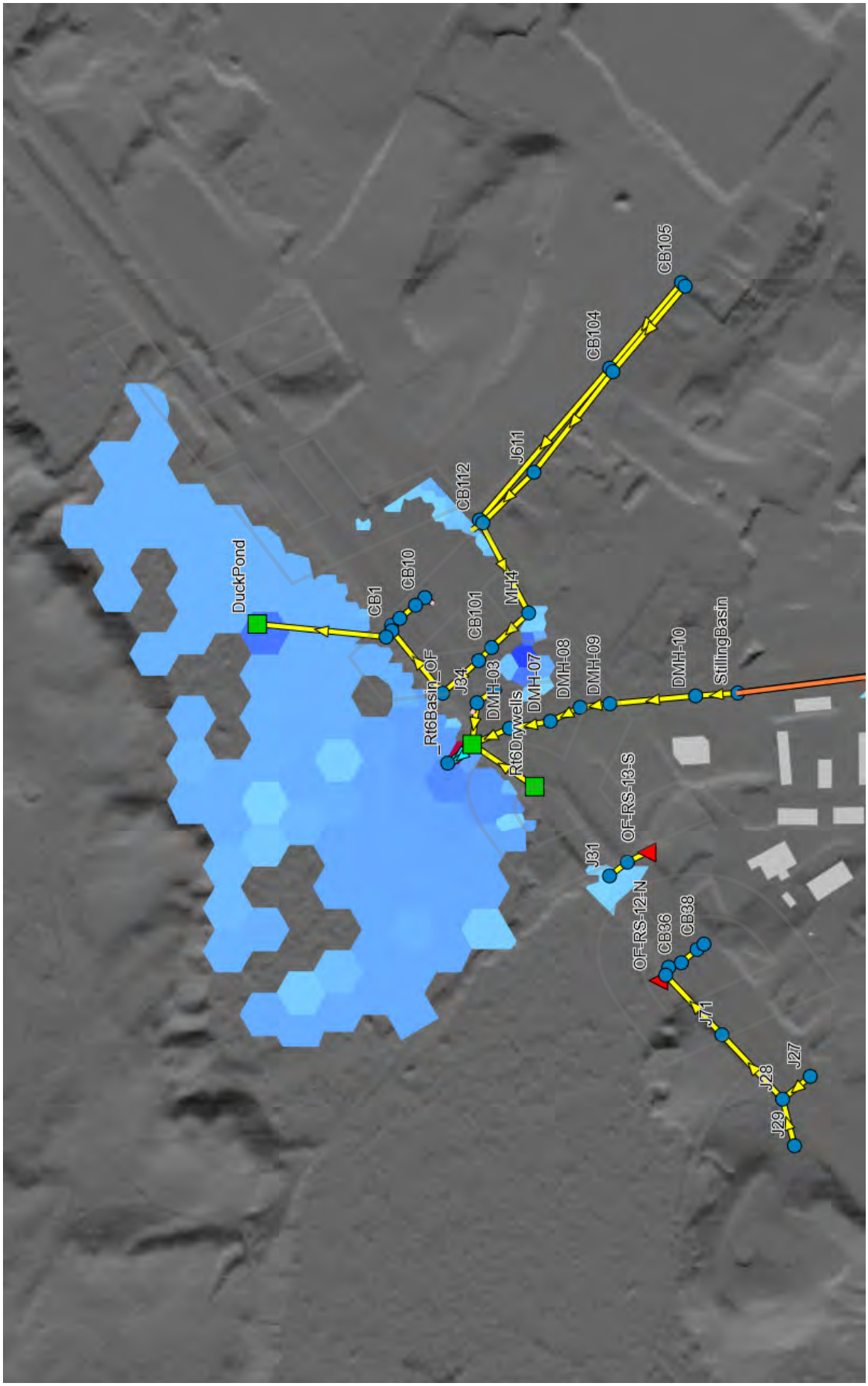


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

ATTACHMENT 5.3

Existing PCSWMM Reports

PCSWMM Report

DRAFT

Existing

Model ShankPainter_EX_2yr24hr_2024.03.21.inp

Apex Companies, LLC

March 30, 2024

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Summary 1: Options

Name	ShankPainter_EX_2yr24hr_2024.03.21
Flow Units	CFS
Infiltration method	Curve Number
Flow routing method	Dynamic Wave
Link offsets defined by	Depth
Allow ponding	No
Skip steady flow periods	No
Inertial dampening	Full
Define supercritical flow by	Both
Force Main Equation	H-W
Variable time step	On
Adjustment factor (%)	75
Conduit lengthening (s)	0
Minimum surface area (ft²)	0.1
Starting date	Oct-31-2018 12:00:00 AM
Ending date	Nov-2-2018 12:00:00 AM
Duration of simulation (hours)	48
Antecedent dry days (days)	0
Rain interval (h:mm)	0:06
Report time step (h:mm:ss)	00:01:00
Wet time step (h:mm:ss)	00:05:00
Dry time step (h:mm:ss)	00:05:00
Routing time step (s)	0.5
Minimum time step used (s)	0.26
Average time step used (s)	0.5
Minimum conduit slope	0
Ignore rainfall/runoff	No
Ignore snow melt	No
Ignore groundwater	No
Ignore flow routing	No
Ignore water quality	No
Report average results	No

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Summary 2: Model inventory

Name	ShankPainter_EX_2yr24hr_2024.03.21
Raingages	3
Subcatchments	0
Aquifers	0
Snowpacks	0
RDII hydrographs	0
Junction nodes	1946
Outfall nodes	349
Flow divider nodes	0
Storage unit nodes	12
Conduit links	5466
Pump links	0
Orifice links	40
Weir links	0
Outlet links	0
Treatment units	0
Transects	1
Control rules	0
Pollutants	0
Land Uses	0
Control Curves	0
Diversion Curves	0
Pump Curves	0
Rating Curves	0
Shape Curves	0
Storage Curves	12
Tidal Curves	0
Weir Curves	0
Time Series	4
Time Patterns	0

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Summary 3: Model complexity

Name	ShankPainter_EX_2yr24hr_2024.03.21
Subcatchments	n/a
Groundwater	n/a
Aquifers	n/a
Snowpacks	n/a
RDII hydrographs	n/a
Junction nodes	3963
Outfall nodes	349
Flow divider nodes	n/a
Storage unit nodes	36
Conduit links	32691
Pump links	n/a
Orifice links	160
Weir links	n/a
Outlet links	n/a
Transect	3
Pollutants	n/a
Land Uses	n/a
Model complexity (total uncertain input parameters)	37202

Summary 4: Node statistics

Name	ShankPainter_EX_2yr24hr_2024.03.21
Max. ground elev. (ft)	81.527
Min. ground elev. (ft)	4.5
Max. invert elev. (ft)	52.558
Min. invert elev. (ft)	1.5
Max. depth (ft)	30
Min. depth (ft)	0

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Summary 5: Conduit statistics

Name	ShankPainter_EX_2yr24hr_2024.03.21
Max. roughness	0.4
Min. roughness	0.01
Max. entry loss coef.	0.5
Min. entry loss coef.	0
Max. exit loss coef.	0
Min. exit loss coef.	0
Max. avg. loss coef.	0.5
Min. avg. loss coef.	0
Max. length (ft)	525.428
Min. length (ft)	5.84
Total length (ft)	129787.795
Max. slope (ft/ft)	2.0301
Min. slope (ft/ft)	-0.6074

Summary 6: Conduit Inventory

Name	ShankPainter_EX_2yr24hr_2024.03.21
Open Rectangular (ft)	122599.077
Circular (ft)	7188.718

Summary 7: Pipe inventory

Name	ShankPainter_EX_2yr24hr_2024.03.21
Max. pipe diameter (ft)	1.5
Min. pipe diameter (ft)	0.833
Total 12” pipe length (ft)	6004.031
Total 15” pipe length (ft)	304.631
Total 18” pipe length (ft)	668.046
Total other pipe length (ft)	212.01
Total pipe length (ft)	7188.718

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Summary 8: Flow routing continuity

Name	ShankPainter_EX_2yr24hr_2024.03.21
Dry weather inflow (MG)	0.000
Wet weather inflow (MG)	0.000
Groundwater inflow (MG)	0.000
RDII inflow (MG)	0.000
External inflow (MG)	3.835
External outflow (MG)	1.328
Flooding loss (MG)	0.932
Evaporation loss (MG)	0.000
Exfiltration loss (MG)	0.000
Initial stored volume (MG)	0.002
Final stored volume (MG)	1.579
Continuity error (%)	-0.031

Summary 9: Results statistics

Name	ShankPainter_EX_2yr24hr_2024.03.21
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	9.32
Num. nodes surcharged	3
Max. node surcharge duration (hours)	0.53
Max. node height above crown (ft)	1.484
Min. node depth below rim (ft)	-0.9
Num. nodes flooded	3
Max. node flooding duration (hours)	36.04
Max. node flood volume (MG)	0.504
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	75.906
Max. storage percent full (%)	100
Max. outfall flow frequency (%)	43.6
Max. outfall peak flow (cfs)	15.41
Max. outfall total volume (MG)	0.554
Total outfall volume (MG)	1.331
Max. link peak flow (cfs)	11.78
Max. link peak velocity (ft/s)	14.28
Min. link peak velocity (ft/s)	0

DRAFT

Summary 9: Results statistics (continued...)

Name	ShankPainter_EX_2yr24hr_2024.03.21
Num. conduits surcharged	37
Max. conduit surcharge duration (hours)	44.17
Max. conduit capacity limited duration (hours)	0.81

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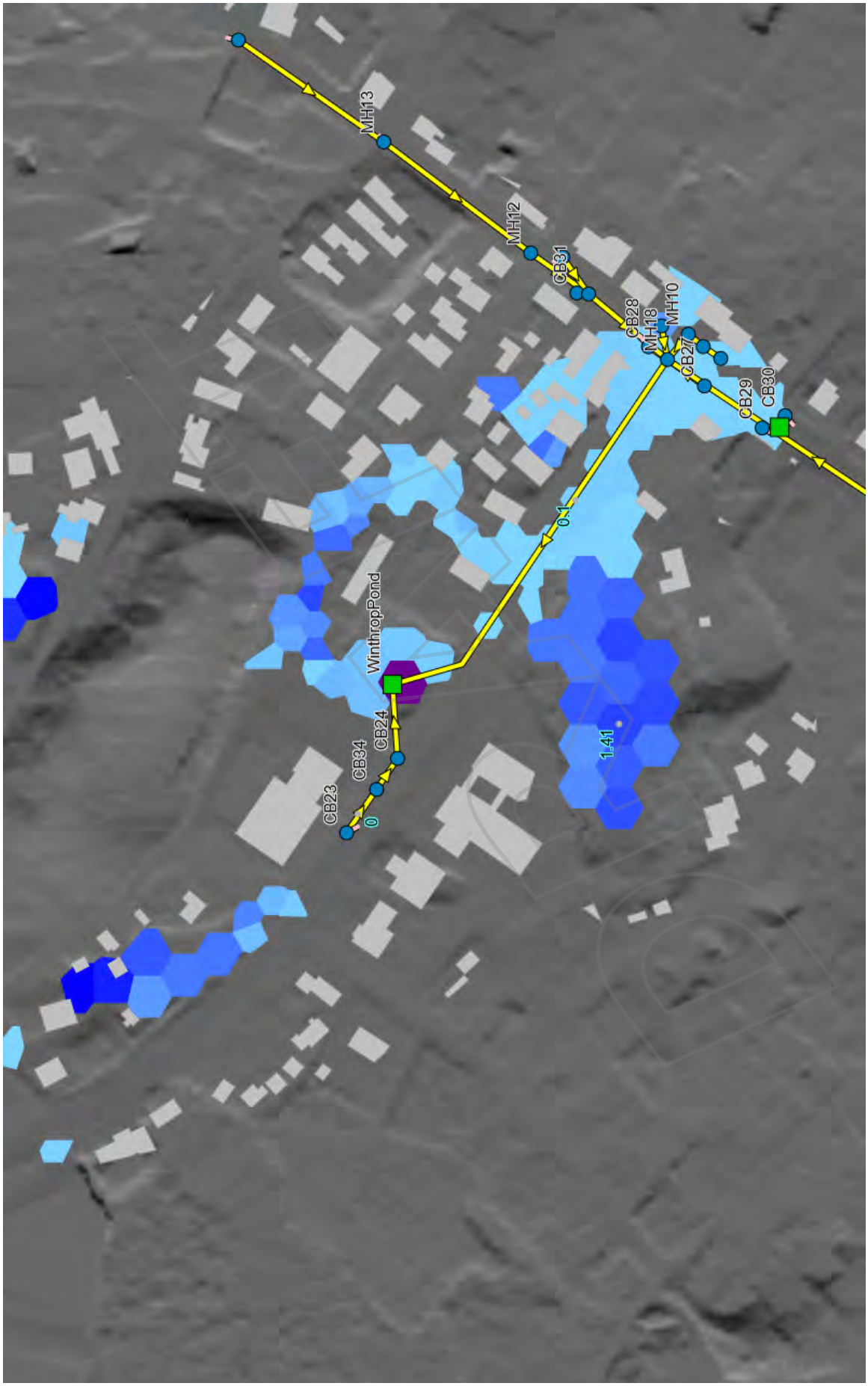


Figure 1: South Shank Painter

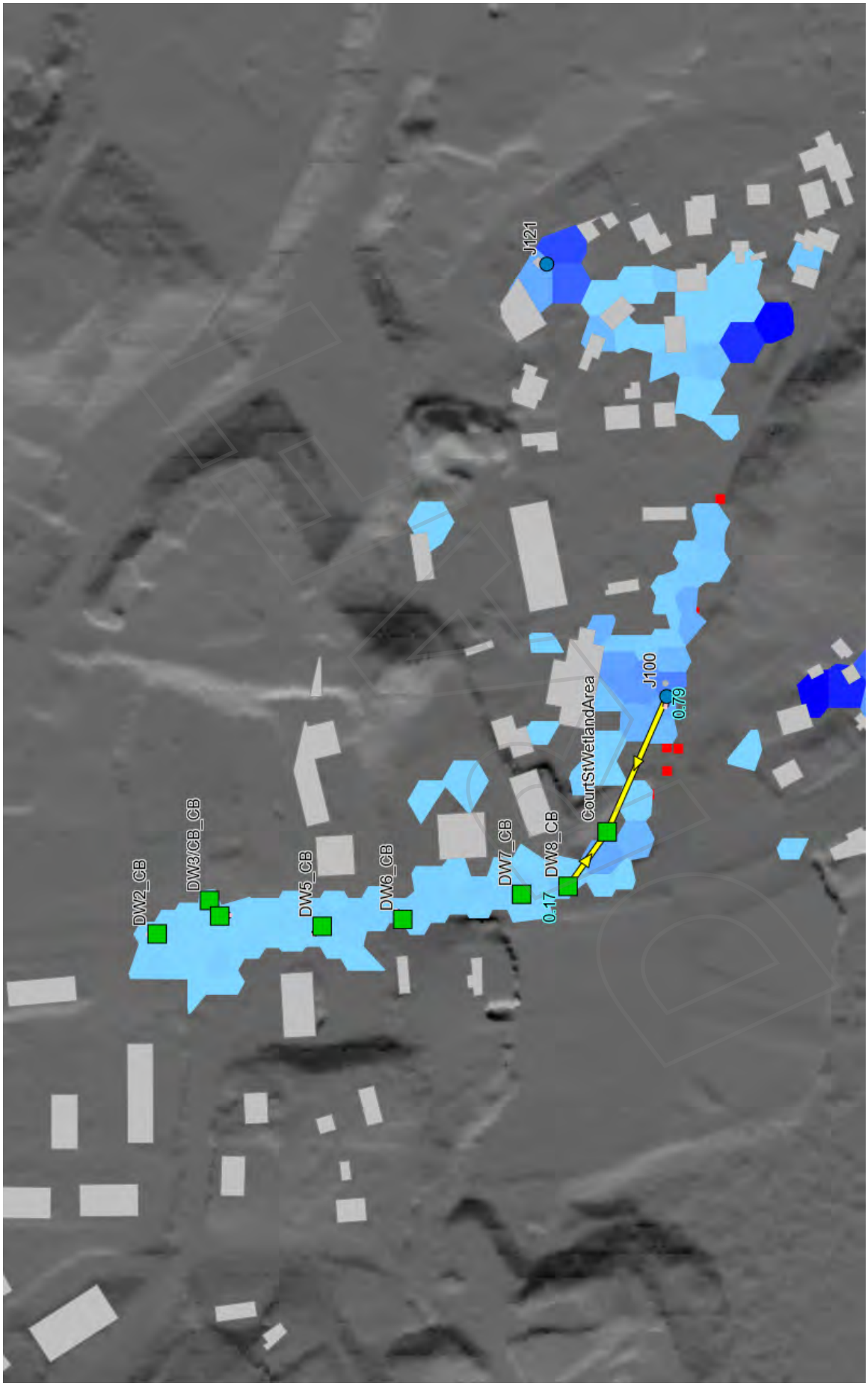


Figure 2: Court Street

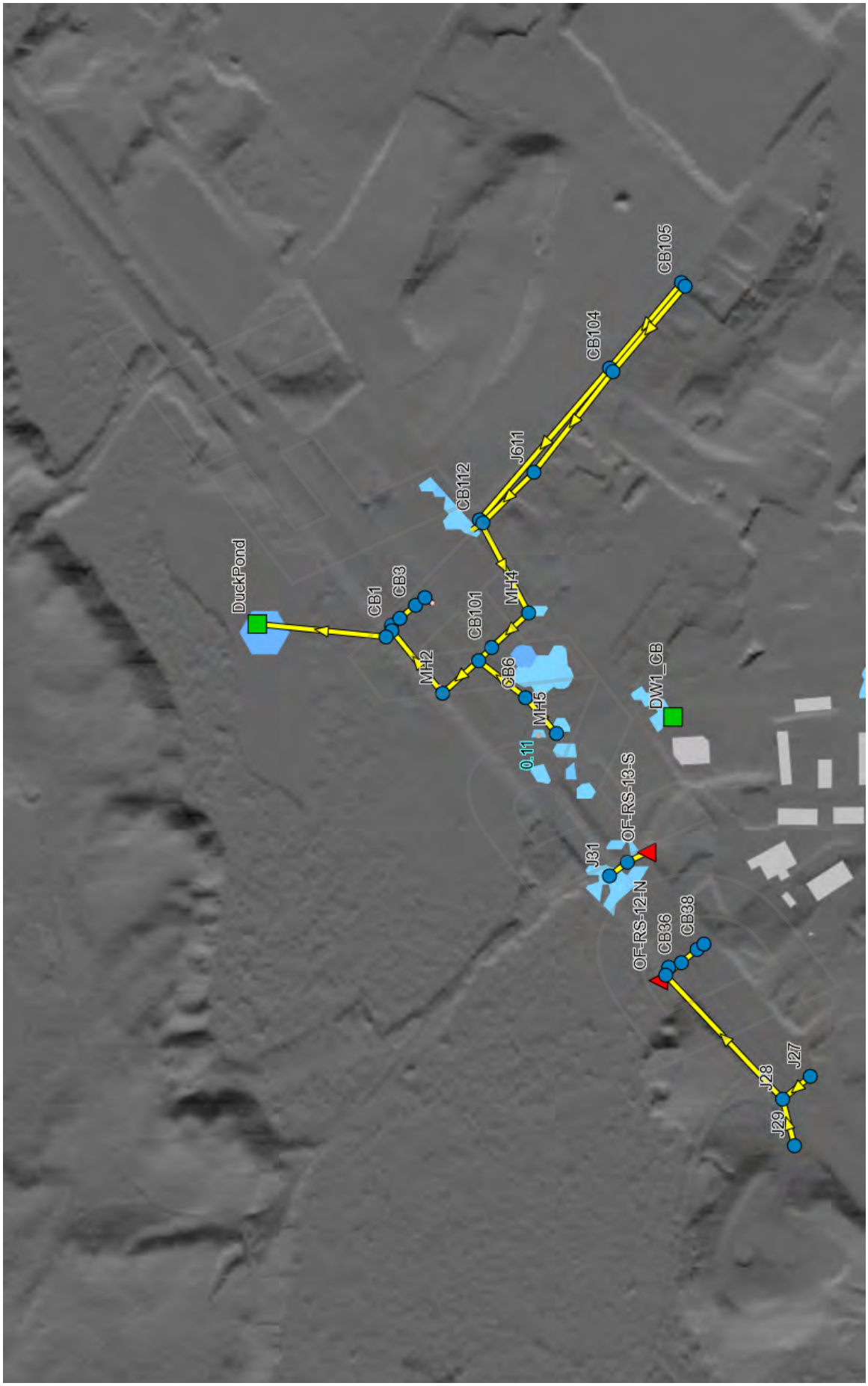


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

Table 1A: Storages

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Evap. Factor (fraction)
CourtStWetlandArea	1010557.027	2846257.418	Zone4	NO	NO	3	6	3	0	0	0	0
DuckPond	1010546.204	2848276.651	DirectConnection	NO	NO	4	5	1	0	0	0	0
DW#9	1011400.39	2845161.145		NO	NO	8.15	15.65	7.5	0	0	0	0
DW1	1010327.064	2847296.604		NO	NO	13.7	23.25	9.55	0	0	0	0
DW2	1010428.943	2846822.099		NO	NO	15.18	23.18	8	0	0	0	0
DW3/CB	1010470.911	2846756.334		NO	NO	14.05	21.85	7.8	0	0	0	0
DW4/CB	1010451.455	2846743.609		NO	NO	14.66	21.16	6.5	0	0	0	0
DW5	1010438.474	2846614.939		NO	NO	11.35	19.35	8	0	0	0	0
DW6	1010447.126	2846514.015		NO	NO	9.72	17.61	7.89	0	0	0	0
DW7	1010478.707	2846364.865		NO	NO	7.79	15.68	7.89	0	0	0	0
DW8	1010488.609	2846306.387		NO	NO	6.56	14.06	7.5	0	0	0	0
WinthropPond	1011093.123	2845623.4	Zone6	NO	NO	1.5	4.5	3	0	0	0	0

Table 1B: Storages

Name	Storage Curve	Coefficient	Exponent	Constant (ft²)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series	Scale Factor
CourtStWetlandArea	TABULAR	1000	0	0	CourtStWetlandArea	0	0	0	0	0			1
DuckPond	TABULAR	1000	0	0	DuckPond5ft	0	0	0	0	0			1
DW#9	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW1	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW2	TABULAR	1000	0	0	Drywell_#2	0	0	0	0	0			1
DW3/CB	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW4/CB	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW5	TABULAR	1000	0	0	Drywell_#5	0	0	0	0	0			1

Table 1B: Storages (continued...)

Name	Storage Curve	Coefficient	Exponent	Constant (ft^2)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series	Scale Factor
DW6	TABULAR	1000	0	0	Drywell_#6	0	0	0	0	0			1
DW7	TABULAR	1000	0	0	Drywell_#7	0	0	0	0	0			1
DW8	TABULAR	1000	0	0	Drywell_#8	0	0	0	0	0			1
WinthropPond	TABULAR	1000	0	0	WinthropPond	0	0	0	0	0			1

Table 1C: Storages

Name	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (fraction)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
CourtStWetlandArea	0						0	0	0	0	1.74	3	6
DuckPond	0						0	0	0	0	0.23	0.33	4.33
DW#9	0						0	0	0	0	5.94	6.94	15.09
DW1	0						0	0	0	0	6.81	9.32	23.02
DW2	0						0	0	0	0	3.34	4.69	19.87
DW3/CB	0						0	0	0	0	3.51	4.74	18.79
DW4/CB	0						0	0	0	0	4.96	6.14	20.8
DW5	0						0	0	0	0	1.89	2.63	13.98
DW6	0						0	0	0	0	5.68	7.53	17.25
DW7	0						0	0	0	0	5.33	7.05	14.84
DW8	0						0	0	0	0	4.97	6.64	13.2
WinthropPond	0						0	0	0	0	2.3	3	4.5

Hydro

Table 1D: Storages

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
CourtStWetlandArea	10/31/2018 12:27 PM	3	0.04	7.44	0.002	0.266	0.111	0	0	2.06	0.15	1.36	0.003
DuckPond	11/01/2018 02:53 AM	0.33	1.73	8	0.148	0.568	0.004	0	0	1.17	0	0	0
DW#9	10/31/2018 12:05 PM	6.94	0	0.61	0	0.021	2.726	0	0	0.56	0	0	0
DW1	10/31/2018 23:02 PM	9.32	0	0.09	0	0.003	8.513	0	0	0.23	0	0	0
DW2	11/01/2018 00:57 AM	4.69	0	0.19	0	0.008	1.853	0	0	3.31	0	0	0
DW3/CB	11/01/2018 01:12 AM	4.74	0	0.04	0	0.002	8.975	0	0	3.06	0	0	0
DW4/CB	10/31/2018 12:10 PM	6.14	0	0.04	0	0.002	9.765	0	0	0.36	0	0	0
DW5	11/01/2018 23:59 PM	2.63	0	0.15	0	0.005	2.017	0	0	5.37	0	0	0
DW6	10/31/2018 12:55 PM	7.53	0	0.64	0	0.014	1.605	0	0	0.36	0	0	0
DW7	10/31/2018 12:30 PM	7.05	0	0.62	0	0.011	1.825	0	0	0.84	0	0	0
DW8	10/31/2018 12:07 PM	6.64	0	0.49	0	0.005	3.834	0	0	0.86	0	0	0
WinthropPond	10/31/2018 12:15 PM	3	2.6	16.07	0.072	0.716	0.88	0	0	0	28.46	12.49	0.425

Table 1E: Storages

Name	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
CourtStWetlandArea	0	6.884	53	0	0	0	12.972	100	2.66	0	0	0
DuckPond	0	51.886	14	0	0	0	75.906	21	0	0	0	0
DW#9	0	0.236	78	0	0	0	0.278	92	0.61	0	0	0
DW1	0	0.275	71	0	0	0	0.379	97	0	0	0	0
DW2	0	0.748	40	0	0	0	1.056	57	0	0	0	0
DW3/CB	0	0.134	43	0	0	0	0.184	59	0	0	0	0
DW4/CB	0	0.195	75	0	0	0	0.244	94	0	0	0	0
DW5	0	0.467	21	0	0	0	0.656	30	0	0	0	0

Table 1E: Storages (continued...)

Name	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
DW6	0	1.346	72	0	0	0	1.79	95	0	0	0	0
DW7	0	1.123	67	0	0	0	1.491	89	0	0	0	0
DW8	0	0.489	65	0	0	0	0.658	88	0.01	0	0	0
WinthropPond	0	29.057	76	0	0	0	38	100	0	0	0	0

Table 1F: Storages

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CourtStWetlandArea	0	0	1
DuckPond	0	0	1
DW#9	0	0	1
DW1	0	0	1
DW2	0	0	1
DW3/CB	0	0	1
DW4/CB	0	0	1
DW5	0	0	1
DW6	0	0	1
DW7	0	0	1
DW8	0	0	1
WinthropPond	0	0	1

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Table 2A: Junctions

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
CB1	1010543.4	2847960.354	Connect2D_orifices	NO	NO	5.58	11.33	5.75	0	30	0	0	
CB101	1010490.895	2847724.25	Connect2D	NO	NO	6.58	12.18	5.6	0	30	0	0	
CB104	1011149.472	2847446.085		NO	NO	11.53	15.969	4.439	0	50	0	0	
CB105	1011351.247	2847276.782		NO	NO	17.62	19.674	2.054	0	50	0	0	
CB112	1010791.703	2847752.789		NO	NO	8.98	12.818	3.838	0	50	0	0	
CB2	1010559.723	2847940.655	Connect2D_orifices	NO	NO	6.08	11.13	5.05	0	30	0	0	
CB23	1010916.007	2845678.085	Connect2D_orifices	NO	NO	3.84	6.04	2.2	0	30	0	0	
CB24	1011004.87	2845617.259	Connect2D_orifices	NO	NO	3.09	5.99	2.9	0	30	0	0	
CB27	1011449.616	2845250.949	Connect2D_orifices	NO	NO	8	10.039	2.039	0	30	0	0	
CB28	1011496.541	2845317.631	Connect2D_orifices	NO	NO	5.5	9.25	3.75	0	30	0	0	
CB29	1011399.511	2845181.95	Connect2D_orifices	NO	NO	11.88	14.18	2.3	0	30	0	0	
CB3	1010590.535	2847903.6	Connect2D_orifices	NO	NO	6.13	11.23	5.1	0	30	0	0	
CB30	1011414.192	2845154.644	Connect2D_orifices	NO	NO	12.37	15.17	2.8	0	30	0	0	
CB31	1011560.681	2845403.096	Connect2D_orifices	NO	NO	8.85	11.7	2.85	0	30	0	0	
CB32	1011603.491	2845420.161	Connect2D_orifices	NO	NO	8.21	10.91	2.7	0	30	0	0	
CB33	1011521.313	2845302.115	Connect2D_orifices	NO	NO	5.55	9.05	3.5	0	30	0	0	
CB34	1010967.796	2845642.325	Connect2D_orifices	NO	NO	3.16	6.06	2.9	0	30	0	0	
CB35	1009736.842	2847306.934		NO	NO	6.76	12.09	5.33	0	30	0	0	
CB36	1009747.672	2847276.924		NO	NO	6.99	12.09	5.1	0	30	0	0	
CB37	1009778.85	2847240.103		NO	NO	7.23	12.04	4.81	0	30	0	0	
CB38	1009791.611	2847223.915		NO	NO	7.85	12.04	4.19	0	30	0	0	
CB4	1010608.483	2847881.463	Connect2D_orifices	NO	NO	6.36	11.16	4.8	0	30	0	0	
CB6	1010372.626	2847644.457	Connect2D_orifices	NO	NO	7.08	11.13	4.05	0	30	0	0	
DW1_CB	1010326.268	2847296.606	Connect2D_orifices	NO	NO	15.7	23.017	7.317	0	30	0	0	
DW2_CB	1010428.791	2846823.007	Connect2D_orifices	NO	NO	17.18	22.856	5.676	0	30	0	0	
DW3/CB_CB	1010471.232	2846756.294	Connect2D_orifices	NO	NO	16.05	21.742	5.692	0	30	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
DW4/CB_CB	1010450.889	2846743.592	Connect2D_orifices	NO	NO	16.66	20.744	4.084	0	30	0	0	
DW5_CB	1010438.501	2846615.469	Connect2D_orifices	NO	NO	13.35	18.726	5.376	0	30	0	0	
DW6_CB	1010446.739	2846514.06	Connect2D_orifices	NO	NO	11.72	17.223	5.503	0	30	0	0	
DW7_CB	1010478.491	2846364.887	Connect2D_orifices	NO	NO	9.79	14.78	4.99	0	30	0	0	
DW8_CB	1010488.932	2846306.194	Connect2D_orifices	NO	NO	8.56	13.472	4.912	0	30	0	0	
J1	1006841.74	2845465.493		NO	NO	27.4	32.9	5.5	0	50	0	0	
J10	1008672.424	2846345.08		NO	NO	31	36.6	5.6	0	50	0	0	
J100	1010726.938	2846182.757		NO	NO	3.31	5.26	1.95	0	0	0	0	
J1048	1010488.392	2846314.248	2D_label	NO	NO	13.649	43.649	30	0	0	0	0	
J11	1005923.53	2844777.21		NO	NO	21	26.115	5.115	0	50	0	0	
J1134	1010743.392	2846184.348	2D_label	NO	NO	5.012	35.012	30	0	0	0	0	
J12	1005617.671	2844526.538		NO	NO	16.5	21.2	4.7	0	50	0	0	
J121	1011269.487	2846333.216	DirectConnection	NO	NO	7.185	7.185	0	0	30	0	0	
J13	1005898.8	2844802.636		NO	NO	20.7	25.178	4.478	0	50	0	0	
J1391	1010938.392	2845664.748	2D_label	NO	NO	5.561	35.561	30	0	0	0	0	
J14	1007660.717	2845841.779		NO	NO	33	38.2	5.2	0	50	0	0	
J15	1007693.105	2845773.999		NO	NO	33.2	38.2	5	0	50	0	0	
J1563	1011313.392	2845404.948	2D_label	NO	NO	7.865	37.865	30	0	0	0	0	
J16	1008017.631	2846022.698		NO	NO	35	40.6	5.6	0	50	0	0	
J17	1008052.712	2845956.117		NO	NO	35.6	40.617	5.017	0	50	0	0	
J18	1005326.069	2844318.463		NO	NO	13.74	17.97	4.23	0	50	0	0	
J2	1009033.294	2846722.781		NO	NO	21.4	27.8	6.4	0	30	0	0	
J20	1005571.622	2844576.409		NO	NO	16	21.2	5.2	0	50	0	0	
J22	1005435.367	2844345.713		NO	NO	14.5	19	4.5	0	50	0	0	
J23	1005396.081	2844465.056		NO	NO	8	13.349	5.349	0	50	0	0	
J25	1007203.876	2845643.62		NO	NO	30.5	35.3	4.8	0	50	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
J26	1007233.433	2845579.973		NO	NO	30.1	35.3	5.2	0	50	0	0	
J27	1009479.713	2846973.226		NO	NO	14.15	19.01	4.86	0	30	0	0	
J28	1009425.906	2847038.355		NO	NO	13.18	18.8	5.62	0	30	0	0	
J29	1009316.153	2847010.384		NO	NO	13.55	21.71	8.16	0	50	0	0	
J3	1006870.603	2845395.681		NO	NO	27.7	32.743	5.043	0	50	0	0	
J30	1009984.72	2847404.505	Connect2D_orifices	NO	NO	4.8	9.3	4.5	0	30	0	0	
J31	1009952.378	2847446.349	Connect2D_orifices	NO	NO	5.1	9.4	4.3	0	30	0	0	
J32	1009718.364	2847313.955		NO	NO	5.5	9.8	4.3	0	50	0	0	
J4	1006494.893	2845267.078		NO	NO	25.7	30.676	4.976	0	50	0	0	
J417	1011045.896	2845352.789	2D_label	NO	NO	2.588	32.588	30	0	0	0	0	
J445	1011141.216	2847438.472		NO	NO	15.852	15.852	0	0	0	0	0	
J5	1006199.682	2845072.656		NO	NO	23.5	28.576	5.076	0	50	0	0	
J564	1010784.775	2847744.961		NO	NO	12.788	12.788	0	0	0	0	0	
J6	1009085.26	2846666.103		NO	NO	22	27.428	5.428	0	30	0	0	
J611	1010904.043	2847624.504		NO	NO	13.624	13.624	0	0	0	0	0	
J66	1011342.74	2847268.156		NO	NO	19.557	19.557	0	0	0	0	0	
J7	1006533.642	2845207.831		NO	NO	24	30.512	6.512	0	50	0	0	
J739	1010284.392	2847613.248	2D_label	NO	NO	11.057	41.057	30	0	0	0	0	
J8	1006239.797	2845014.495		NO	NO	22.8	28.379	5.579	0	50	0	0	
J9	1008626.945	2846408.03		NO	NO	32	36.8	4.8	0	50	0	0	
MH1	1010530.644	2847959.58	Connect2D_MH	NO	NO	4.73	10.954	6.224	0	30	0	0	
MH10	1011511.543	2845270.131		NO	NO	8.24	10.04	1.8	0	50	0	0	
MH11	1011559.458	2845389.196		NO	NO	8	11.188	3.188	0	50	0	0	
MH12	1011608.36	2845458.27	Connect2D_orifices	NO	NO	12	15.157	3.157	0	30	0	0	
MH13	1011741.006	2845633.705	Connect2D_orifices	NO	NO	24	28.74	4.74	0	30	0	0	
MH14	1011862.65	2845807.307	Connect2D_orifices	NO	NO	31	35.203	4.203	0	30	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
MH15	1011240.734	2844935.933	Connect2D_orifices	NO	NO	25	30.512	5.512	0	30	0	0	
MH16	1011171.126	2844842.863	Connect2D_orifices	NO	NO	25.5	30.676	5.176	0	30	0	0	
MH17	1011090.371	2844735.468	Connect2D_orifices	NO	NO	28.44	32.448	4.008	0	30	0	0	
MH18	1011481.215	2845295.06		NO	NO	5.62	8.957	3.337	0	50	0	0	
MH2	1010382.993	2847839.795	Connect2D	NO	NO	5.58	11.867	6.287	0	30	0	0	
MH3	1010459.751	2847754.847	Connect2D	NO	NO	6.08	12.069	5.989	0	30	0	0	
MH4	1010572.351	2847637.139	Connect2D	NO	NO	7.83	12.009	4.179	0	30	0	0	
MH5	1010288.201	2847571.427	Connect2D_orifices	NO	NO	7.45	11.5	4.05	0	30	0	0	
MH8	1011482.438	2845231.488		NO	NO	8.21	10.51	2.3	0	50	0	0	
MH9	1011496.673	2845252.412		NO	NO	8.1	10.1	2	0	50	0	0	
OF-SP-1-WJ	1010515.721	2847973.034	Zone2	NO	NO	4.67	4.67	0	0	0	0	0	

Table 2B: Junctions

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
CB1		1	0						0	0.03	0.8	6.38	10/31/2018 12:14 PM	0.8
CB101		1	0						0	0.12	3.51	10.09	10/31/2018 12:17 PM	3.51
CB104		1	0						0	0.14	4.58	16.11	10/31/2018 12:25 PM	4.58
CB105		1	0						0	0.06	1.43	19.05	10/31/2018 12:26 PM	1.43
CB112		1	0						0	0.14	4	12.98	10/31/2018 12:19 PM	4
CB2		1	0						0	0.03	0.44	6.52	10/31/2018 12:05 PM	0.44
CB23		1	0						0	0.5	0.81	4.65	10/31/2018 12:15 PM	0.8
CB24		1	0						0	1.07	1.49	4.58	10/31/2018 12:15 PM	1.49
CB27		1	0						0	0.01	0.13	8.13	10/31/2018 12:03 PM	0.13

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
CB28		1	0						0	0.22	2.25	7.75	10/31/2018 12:05 PM	2.24
CB29		1	0						0	2.56	3.2	15.08	10/31/2018 12:05 PM	3.2
CB3		1	0						0	0.01	0.39	6.52	10/31/2018 12:05 PM	0.39
CB30		1	0						0	2.13	2.73	15.1	10/31/2018 12:05 PM	2.73
CB31		1	0						0	0	0.66	9.51	10/31/2018 12:05 PM	0.64
CB32		1	0						0	0.04	1.34	9.55	10/31/2018 12:05 PM	1.34
CB33		1	0						0	0.25	3.98	9.53	10/31/2018 12:05 PM	3.98
CB34		1	0						0	1.02	1.46	4.62	10/31/2018 12:15 PM	1.46
CB35		1	0						0	0	0	6.76	10/31/2018 00:00 AM	0
CB36		1	0						0	0.02	0.23	7.22	10/31/2018 12:05 PM	0.23
CB37		1	0						0	0.03	0.31	7.54	10/31/2018 12:10 PM	0.31
CB38		1	0						0	0.02	0.2	8.05	10/31/2018 12:10 PM	0.2
CB4		1	0						0	0	0.16	6.52	10/31/2018 12:05 PM	0.16
CB6		1	0						0	0.07	2.7	9.78	10/31/2018 12:13 PM	2.7
DW1_CB		1	0						0	5.2	7.32	23.02	10/31/2018 23:03 PM	7.32
DW2_CB		1	0						0	1.82	2.69	19.87	11/01/2018 00:56 AM	2.69
DW3/CB_CB		1	0						0	1.9	2.74	18.79	11/01/2018 01:05 AM	2.74
DW4/CB_CB		1	0						0	3.21	4.14	20.8	10/31/2018 12:11 PM	4.14
DW5_CB		1	0						0	0.39	0.63	13.98	11/01/2018 18:27 PM	0.63
DW6_CB		1	0						0	4.11	5.53	17.25	10/31/2018 12:56 PM	5.53
DW7_CB		1	0						0	3.75	5.05	14.84	10/31/2018 12:31 PM	5.05
DW8_CB		1	0						0	3.36	4.64	13.2	10/31/2018 12:07 PM	4.64
J1		1	0						0	0.02	0.24	27.64	10/31/2018 12:05 PM	0.24
J10		1	0						0	0.01	0.14	31.14	10/31/2018 12:05 PM	0.14
J100		1	0						0	1.47	1.95	5.26	10/31/2018 11:57 AM	1.95
J1048		1	0						0	0.01	0.17	13.82	10/31/2018 12:06 PM	0.17

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
J11		1	0						0	0.03	0.43	21.43	10/31/2018 12:05 PM	0.43
J1134		1	0						0	0.31	0.79	5.8	10/31/2018 12:20 PM	0.79
J12		1	0						0	0.04	0.45	16.95	10/31/2018 12:05 PM	0.45
J121		1	0						0	0.43	0.66	7.84	10/31/2018 12:05 PM	0.66
J13		1	0						0	0.03	0.49	21.19	10/31/2018 12:05 PM	0.49
J1391		1	0						0	0	0	5.56	10/31/2018 00:00 AM	0
J14		1	0						0	0.02	0.2	33.2	10/31/2018 12:05 PM	0.2
J15		1	0						0	0.04	0.39	33.59	10/31/2018 12:05 PM	0.39
J1563		1	0						0	0	0.1	7.97	10/31/2018 12:06 PM	0.1
J16		1	0						0	0.01	0.15	35.15	10/31/2018 12:05 PM	0.15
J17		1	0						0	0.02	0.23	35.83	10/31/2018 12:05 PM	0.23
J18		1	0						0	0.02	0.23	13.97	10/31/2018 12:05 PM	0.23
J2		1	0						0	0.02	0.23	21.63	10/31/2018 12:10 PM	0.23
J20		1	0						0	0.03	0.37	16.37	10/31/2018 12:05 PM	0.37
J22		1	0						0	0.01	0.18	14.68	10/31/2018 12:05 PM	0.18
J23		1	0						0	0.03	0.47	8.47	10/31/2018 12:05 PM	0.47
J25		1	0						0	0.02	0.29	30.79	10/31/2018 12:05 PM	0.29
J26		1	0						0	0.03	0.29	30.39	10/31/2018 12:20 PM	0.29
J27		1	0						0	0.03	0.24	14.39	10/31/2018 12:20 PM	0.24
J28		1	0						0	0.04	0.43	13.61	10/31/2018 12:06 PM	0.43
J29		1	0						0	0.04	0.68	14.23	10/31/2018 12:05 PM	0.68
J3		1	0						0	0.02	0.3	28	10/31/2018 12:05 PM	0.3
J30		1	0						0	0.11	3.75	8.55	10/31/2018 12:05 PM	3.75
J31		1	0						0	0.11	4.49	9.59	10/31/2018 12:10 PM	4.49
J32		1	0						0	0.04	0.46	5.96	10/31/2018 12:07 PM	0.46
J4		1	0						0	0.02	0.22	25.92	10/31/2018 12:05 PM	0.22

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
J417		1	0						0	1.01	1.41	4	11/01/2018 23:59 PM	1.41
J445		1	0						0	0	0.05	15.9	10/31/2018 12:27 PM	0.05
J5		1	0						0	0.01	0.05	23.55	10/31/2018 14:50 PM	0.05
J564		1	0						0	0.01	0.1	12.89	10/31/2018 12:24 PM	0.1
J6		1	0						0	0.03	0.37	22.37	10/31/2018 12:10 PM	0.37
J611		1	0						0	0.01	0.11	13.73	10/31/2018 12:25 PM	0.11
J66		1	0						0	0	0	19.56	10/31/2018 00:00 AM	0
J7		1	0						0	0.01	0.18	24.18	10/31/2018 12:05 PM	0.18
J739		1	0						0	0.07	0.11	11.17	11/02/2018 00:00 AM	0.11
J8		1	0						0	0.02	0.18	22.98	10/31/2018 12:10 PM	0.18
J9		1	0						0	0	0	32	10/31/2018 00:00 AM	0
MH1		1	0						0	0.13	1.64	6.37	10/31/2018 12:15 PM	1.64
MH10		1	0						0	0	0	8.24	10/31/2018 12:03 PM	0
MH11		1	0						0	0.05	1.51	9.51	10/31/2018 12:05 PM	1.49
MH12		1	0						0	0.04	0.43	12.43	10/31/2018 12:05 PM	0.43
MH13		1	0						0	0.03	0.3	24.3	10/31/2018 12:05 PM	0.3
MH14		1	0						0	0.01	0.19	31.19	10/31/2018 12:05 PM	0.19
MH15		1	0						0	0.03	0.32	25.32	10/31/2018 12:05 PM	0.32
MH16		1	0						0	0.05	0.55	26.05	10/31/2018 12:05 PM	0.55
MH17		1	0						0	0.02	0.17	28.61	10/31/2018 12:05 PM	0.17
MH18		1	0						0	0.11	2.98	8.6	10/31/2018 12:03 PM	2.12
MH2		1	0						0	0.13	2.59	8.17	10/31/2018 12:17 PM	2.59
MH3		1	0						0	0.14	3.18	9.26	10/31/2018 12:17 PM	3.17
MH4		1	0						0	0.13	4.2	12.03	10/31/2018 12:17 PM	4.2
MH5		1	0						0	0.04	2.35	9.8	10/31/2018 12:13 PM	2.34
MH8		1	0						0	0	0	8.21	10/31/2018 00:00 AM	0

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
MH9		1	0						0	0	0	8.1	10/31/2018 12:10 PM	0
OF-SP-1-WJ		1	0						0	0.08	0.87	5.54	10/31/2018 12:14 PM	0.87

Table 2C: Junctions

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
CB1	0	1.38	0	0.039	0.001	0	0	4.95	0	0	0	0	0	0
CB101	0	4.01	0	0.293	0.014	0	0	2.09	0	0	0	0	0	0
CB104	0.86	4.1	0.044	0.221	-0.07	0	0	-0.141	0	0	0	0	0	0
CB105	3.45	3.45	0.177	0.177	-0.003	0	0	0.624	0	0	0	0	0	0
CB112	0	2.95	0	0.213	0.072	0	0	-0.162	0	0	0	0	0	0
CB2	1.42	1.42	0.039	0.039	-0.004	0	0	4.61	0	0	0	0	0	0
CB23	1.3	1.3	0.037	0.037	0.346	0	0	1.39	0	0	0	0	0	0
CB24	0.09	1.91	0.003	0.056	0.84	0	0	1.41	0	0	0	0	0	0
CB27	0.21	0.25	0.007	0.008	-0.012	0	0	1.909	0	0	0	0	0	0
CB28	0.18	0.57	0.005	0.006	0.089	0	0	1.5	0	0	0	0	0	0
CB29	2.29	2.89	0.069	0.087	0.142	0	0	-0.9	0	0	0	0	0	0
CB3	0	0.02	0	0	-0.018	0	0	4.71	0	0	0	0	0	0
CB30	0.61	0.61	0.019	0.019	0.42	0	0	0.07	0	0	0	0	0	0
CB31	0	0.14	0	0	0.163	0	0	2.19	0	0	0	0	0	0
CB32	0.95	0.95	0.026	0.026	0.004	0	0	1.36	0	0	0	0	0	0
CB33	12.35	12.35	0.35	0.354	0.004	0	0	-0.48	0	0	0	0	0	0
CB34	0.59	1.87	0.016	0.054	0.741	0	0	1.44	0	0	0	0	0	0
CB35	0	0	0	0	0	0	0	5.33	0	0	0	0	0	0

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Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
CB36	0.21	0.67	0.008	0.027	0.003	0	0	4.87	0	0	0	0	0	0
CB37	0	0.47	0	0.02	0.003	0	0	4.5	0	0	0	0	0	0
CB38	0.47	0.47	0.02	0.02	-0.001	0	0	3.99	0	0	0	0	0	0
CB4	0	0.01	0	0	0.318	0	0	4.64	0	0	0	0	0	0
CB6	2.59	2.96	0.074	0.088	0.005	0	0	1.35	0	0	0	0	0	0
DW1_CB	0	0.1	0	0.003	5.79	0	0	-0.003	0	0	0	0	0	0
DW2_CB	0	0.19	0	0.009	0.982	0	0	2.986	0	0	0	0	0	0
DW3/CB_CB	0	0.04	0	0.002	4.5	0	0	2.952	0	0	0	0	0	0
DW4/CB_CB	0	0.04	0	0.002	5.485	0	0	-0.056	0	0	0	0	0	0
DW5_CB	0	0.15	0	0.005	0.569	0	0	4.746	0	0	0	0	0	0
DW6_CB	0	0.65	0	0.014	1.074	0	0	-0.027	0	0	0	0	0	0
DW7_CB	0	0.63	0	0.012	1.182	0	0	-0.06	0	0	0	0	0	0
DW8_CB	0	0.62	0	0.026	0.478	0	0	0.77	0	0	0	0	0	0
J1	0.26	0.65	0.009	0.02	0.007	0	0	5.26	0	0	0	0	0	0
J10	0.46	0.46	0.013	0.013	0	0	0	5.46	0	0	0	0	0	0
J100	0	9.76	0	0.523	0.156	0	0	0.117	36.04	9.76	0.504	0	0	0
J1048	0	6.05	0	0.204	-0.001	0	0	29.829	0	0	0	0	0	0
J11	0.96	0.96	0.027	0.027	0	0	0	4.685	0	0	0	0	0	0
J1134	10.16	10.16	0.326	0.332	0	0	0	29.212	0	0	0	0	0	0
J12	1.11	1.11	0.032	0.032	0.001	0	0	4.25	0	0	0	0	0	0
J121	3.84	3.84	0.107	0.107	1.406	0	0	-0.655	0	0	0	0	0	0
J13	1.25	2.21	0.035	0.061	0	0	0	3.988	0	0	0	0	0	0
J1391	0	0	0	0	0	0	0	30.001	0	0	0	0	0	0
J14	0	0.59	0	0.017	0.001	0	0	5	0	0	0	0	0	0
J15	0.59	0.59	0.017	0.017	-0.001	0	0	4.61	0	0	0	0	0	0
J1563	0	5.24	0	0.083	0.002	0	0	29.895	0	0	0	0	0	0

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
J16	0	0.3	0	0.008	0.001	0	0	5.45	0	0	0	0	0	0
J17	0.3	0.3	0.008	0.008	-0.001	0	0	4.787	0	0	0	0	0	0
J18	0.66	0.66	0.018	0.018	0	0	0	4	0	0	0	0	0	0
J2	0	0.79	0	0.03	0.001	0	0	6.17	0	0	0	0	0	0
J20	0.81	1.92	0.023	0.056	-0.002	0	0	4.83	0	0	0	0	0	0
J22	0.51	0.51	0.014	0.014	0.003	0	0	4.32	0	0	0	0	0	0
J23	0	2.42	0	0.07	0.001	0	0	4.879	0	0	0	0	0	0
J25	0.43	0.43	0.014	0.014	-0.008	0	0	4.51	0	0	0	0	0	0
J26	1.24	1.51	0.054	0.068	0.002	0	0	4.91	0	0	0	0	0	0
J27	0.43	0.43	0.03	0.03	0.026	0	0	4.62	0	0	0	0	0	0
J28	0.09	1.76	0.007	0.084	-0.011	0	0	5.19	0	0	0	0	0	0
J29	1.65	1.65	0.047	0.047	-0.011	0	0	7.48	0	0	0	0	0	0
J3	0.39	0.39	0.011	0.011	-0.012	0	0	4.743	0	0	0	0	0	0
J30	3.51	7.64	0.109	0.316	0	0	0	0.75	0	0	0	0	0	0
J31	6.34	6.34	0.217	0.217	0.001	0	0	-0.19	0	0	0	0	0	0
J32	0	2.41	0	0.112	0.005	0	0	3.84	0	0	0	0	0	0
J4	0.5	0.5	0.014	0.014	0.001	0	0	4.756	0	0	0	0	0	0
J417	6.45	6.45	0.219	0.222	0	0	0	28.588	0	0	0	0	0	0
J445	0	1.43	0	0.011	0.02	0	0	0.452	0	0	0	0	0	0
J5	0.02	0.02	0.003	0.003	0.036	0	0	5.026	0	0	0	0	0	0
J564	0	4.81	0	0.171	-0.003	0	0	0.398	0	0	0	0	0	0
J6	0.79	0.79	0.03	0.03	-0.001	0	0	5.058	0	0	0	0	0	0
J611	3.9	4.45	0.158	0.168	0	0	0	0.394	0	0	0	0	0	0
J66	0	0	0	0	0	0	0	0.497	0	0	0	0	0	0
J7	0.57	1.07	0.016	0.03	-0.001	0	0	6.332	0	0	0	0	0	0
J739	0	0.01	0	0	0	0	0	29.887	0	0	0	0	0	0

HEC-RAS

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
J8	0.96	0.96	0.032	0.035	-0.003	0	0	5.399	0	0	0	0	0	0
J9	0	0	0	0	0	0	0	4.8	0	0	0	0	0	0
MH1	0	6.62	0	0.42	0.024	0.53	0.39	4.584	0	0	0	0	0	0
MH10	0	0.04	0	0	-0.059	0	0	1.8	0	0	0	0	0	0
MH11	0.08	3.77	0.003	0.112	-0.003	0.06	0.508	1.68	0	0	0	0	0	0
MH12	1.28	2.8	0.036	0.083	0.001	0	0	2.727	0	0	0	0	0	0
MH13	1.12	1.53	0.035	0.046	-0.005	0	0	4.44	0	0	0	0	0	0
MH14	0.42	0.42	0.012	0.012	0.013	0	0	4.013	0	0	0	0	0	0
MH15	0.28	1.55	0.008	0.048	-0.01	0	0	5.192	0	0	0	0	0	0
MH16	0.97	1.29	0.03	0.04	-0.001	0	0	4.626	0	0	0	0	0	0
MH17	0.32	0.32	0.01	0.01	-0.004	0	0	3.838	0	0	0	0	0	0
MH18	0	12.56	0	0.498	-0.034	0.22	1.484	0.353	0	0	0	0	0	0
MH2	0	5.85	0	0.381	-0.005	0	0	3.697	0	0	0	0	0	0
MH3	0	5.86	0	0.381	-0.022	0	0	2.809	0	0	0	0	0	0
MH4	2.51	4.15	0.083	0.294	0.061	0	0	-0.021	0	0	0	0	0	0
MH5	0.51	0.51	0.014	0.014	-0.012	0	0	1.7	0	0	0	0	0	0
MH8	0	0	0	0	0	0	0	2.3	0	0	0	0	0	0
MH9	0	0	0	0	165	0	0	2	0	0	0	0	0	0
OF-SP-1-WJ	0	6.62	0	0.42	-0.02	0	0	0.63	0	0	0	0	0	0

Table 2D: Junctions

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CB1	0	0	0	1
CB101	0	0	0	1
CB104	0	0	0	1
CB105	0	0	0	1
CB112	0	0	0	1
CB2	0	0	0	1
CB23	0	0	0	1
CB24	0	0	0	1
CB27	0	0	0	1
CB28	0	0	0	1
CB29	0	0	0	1
CB3	0	0	0	1
CB30	0	0	0	1
CB31	0	0	0	1
CB32	0	0	0	1
CB33	0	0	0	1
CB34	0	0	0	1
CB35	0	0	0	1
CB36	0	0	0	1
CB37	0	0	0	1
CB38	0	0	0	1
CB4	0	0	0	1
CB6	0	0	0	1
DW1_CB	0	0	0	1
DW2_CB	0	0	0	1
DW3/CB_CB	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
DW4/CB_CB	0	0	0	1
DW5_CB	0	0	0	1
DW6_CB	0	0	0	1
DW7_CB	0	0	0	1
DW8_CB	0	0	0	1
J1	0	0	0	1
J10	0	0	0	1
J100	0	0	0	1
J1048	0	0	0	1
J11	0	0	0	1
J1134	0	0	0	1
J12	0	0	0	1
J121	0	0	0	1
J13	0	0	0	1
J1391	0	0	0	1
J14	0	0	0	1
J15	0	0	0	1
J1563	0	0	0	1
J16	0	0	0	1
J17	0	0	0	1
J18	0	0	0	1
J2	0	0	0	1
J20	0	0	0	1
J22	0	0	0	1
J23	0	0	0	1
J25	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J26	0	0	0	1
J27	0	0	0	1
J28	0	0	0	1
J29	0	0	0	1
J3	0	0	0	1
J30	0	0	0	1
J31	0	0	0	1
J32	0	0	0	1
J4	0	0	0	1
J417	0	0	0	1
J445	0	0	0	1
J5	0	0	0	1
J564	0	0	0	1
J6	0	0	0	1
J611	0	0	0	1
J66	0	0	0	1
J7	0	0	0	1
J739	0	0	0	1
J8	0	0	0	1
J9	0	0	0	1
MH1	0	0	0	1
MH10	0	0	0	1
MH11	0	0	0	1
MH12	0	0	0	1
MH13	0	0	0	1
MH14	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
MH15	0	0	0	1
MH16	0	0	0	1
MH17	0	0	0	1
MH18	0	0	0	1
MH2	0	0	0	1
MH3	0	0	0	1
MH4	0	0	0	1
MH5	0	0	0	1
MH8	0	0	0	1
MH9	0	0	0	1
OF-SP-1-WJ	0	0	0	1

Table 3A: Orifices

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)
OR103	CB105	J66		BOTTOM	RECT_CLOSED	2	2	2.054	0.65	NO	0	NO	0	10/31/2018 00:00 AM
OR104	CB104	J445		BOTTOM	RECT_CLOSED	2	2	4.439	0.65	NO	0	NO	1.43	10/31/2018 12:25 PM
OR105	CB112	J564		BOTTOM	RECT_CLOSED	2	2	3.838	0.65	NO	0	NO	0.66	10/31/2018 12:19 PM
OR35	J100	J1133		BOTTOM	RECT_CLOSED	2	2	2.067	0.65	NO	0	NO	7.31	10/31/2018 12:20 PM

Level 2

Table 3B: Orifices

Name	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OR103	0	0	0	0	3.694	0	1
OR104	0	0	0	0	3.422	0	1
OR105	0	0	0	0	3.186	0	1
OR35	0	0	0	0	4.158	0	1

Table 4A: Outfalls

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Tide Gate	Route To	Type	Fixed Stage (ft)	Curve Name	Series Name	Outlet	Baseline (cfs)	Baseline Pattern
OF-RS-10-S	1008709.714	2846286.735	Zone1	NO	NO	23.64	26.1	NO		FREE	0	*	*		0	
OF-RS-11-N	1008997.279	2846761.397	Zone1	NO	NO	18.64	21.1	NO		FREE	0	*	*		0	
OF-RS-12-N	1009705.646	2847331.275	Zone1	NO	NO	4.5	7.3	NO		FREE	0	*	*		0	
OF-RS-13-S	1010007.673	2847359.187	Zone1	NO	NO	4.12	8.86	NO		FREE	0	*	*		0	
OF-RS-1-N	1005291.471	2844369.017		NO	NO	12.17	12.17	NO		FREE	0	*	*		0	
OF-RS-2-N	1005381.777	2844473.665		NO	NO	7.26	7.26	NO		FREE	0	*	*		0	
OF-RS-3-N	1005823.967	2844899.856		NO	NO	19.37	19.37	NO		FREE	0	*	*		0	
OF-RS-4-S	1006279.282	2844959.564		NO	NO	11.15	11.15	NO		FREE	0	*	*		0	
OF-RS-5-S	1006567.492	2845149.66		NO	NO	10.22	10.22	NO		FREE	0	*	*		0	
OF-RS-6-N	1006807.849	2845520.893	Zone1	NO	NO	25.67	25.67	NO		FREE	0	*	*		0	
OF-RS-7-S	1007261.284	2845510.96	Zone1	NO	NO	25.15	25.15	NO		FREE	0	*	*		0	
OF-RS-8-N	1007630.539	2845893.742	Zone1	NO	NO	30.08	30.08	NO		FREE	0	*	*		0	
OF-RS-9-N	1007998.589	2846072.311	Zone1	NO	NO	33.13	33.13	NO		FREE	0	*	*		0	

Table 4B: Outfalls

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-10-S		1	0						0	0.01	0.14	23.78	10/31/2018 12:05 PM	0.14
OF-RS-11-N		1	0						0	0.02	0.22	18.86	10/31/2018 12:10 PM	0.22
OF-RS-12-N		1	0						0	0.04	0.4	4.9	10/31/2018 12:07 PM	0.4
OF-RS-13-S		1	0						0	0.08	1	5.12	10/31/2018 12:00 PM	1
OF-RS-1-N		1	0						0	0.02	0.22	12.39	10/31/2018 12:05 PM	0.22
OF-RS-2-N		1	0						0	0.03	0.41	7.67	10/31/2018 12:05 PM	0.4
OF-RS-3-N		1	0						0	0.03	0.47	19.84	10/31/2018 12:05 PM	0.47
OF-RS-4-S		1	0						0	0.01	0.18	11.33	10/31/2018 12:10 PM	0.18
OF-RS-5-S		1	0						0	0.01	0.18	10.4	10/31/2018 12:05 PM	0.18
OF-RS-6-N		1	0						0	0.02	0.23	25.9	10/31/2018 12:05 PM	0.23
OF-RS-7-S		1	0						0	0.02	0.28	25.43	10/31/2018 12:20 PM	0.28
OF-RS-8-N		1	0						0	0.02	0.19	30.27	10/31/2018 12:05 PM	0.19
OF-RS-9-N		1	0						0	0.01	0.15	33.28	10/31/2018 12:05 PM	0.15

Table 4C: Outfalls

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-10-S	0	0.46	0	0.013	0	0	0	0	0	0	0	0	28.21	0.04	0.46	0.013
OF-RS-11-N	0	0.79	0	0.03	0	0	0	0	0	0	0	0	26.22	0.09	0.79	0.03
OF-RS-12-N	0	2.41	0	0.112	0	0	0	0	0	0	0	0	28.82	0.3	2.41	0.112
OF-RS-13-S	7.8	15.41	0.238	0.554	0	0	0	0	0	0	0	0	37.86	1.13	15.41	0.554
OF-RS-1-N	0	0.66	0	0.018	0	0	0	0	0	0	0	0	33.41	0.04	0.66	0.018
OF-RS-2-N	0	2.4	0	0.07	0	0	0	0	0	0	0	0	43.6	0.12	2.4	0.07
OF-RS-3-N	0	2.21	0	0.061	0	0	0	0	0	0	0	0	31.02	0.15	2.21	0.061

Table 4C: Outfalls (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-4-S	0	0.95	0	0.035	0	0	0	0	0	0	0	0	27.51	0.1	0.95	0.035
OF-RS-5-S	0	1.07	0	0.03	0	0	0	0	0	0	0	0	31.49	0.07	1.07	0.03
OF-RS-6-N	0	0.65	0	0.02	0	0	0	0	0	0	0	0	29.92	0.05	0.65	0.02
OF-RS-7-S	0	1.51	0	0.068	0	0	0	0	0	0	0	0	28.91	0.18	1.51	0.068
OF-RS-8-N	0	0.59	0	0.017	0	0	0	0	0	0	0	0	41.03	0.03	0.59	0.017
OF-RS-9-N	0	0.3	0	0.008	0	0	0	0	0	0	0	0	36.29	0.02	0.3	0.008

Table 4D: Outfalls

Name	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
OF-RS-10-S	0	0	0	0	0	1
OF-RS-11-N	0	0	0	0	0	1
OF-RS-12-N	0	0	0	0	0	1
OF-RS-13-S	0	0	0	0	0	1
OF-RS-1-N	0	0	0	0	0	1
OF-RS-2-N	0	0	0	0	0	1
OF-RS-3-N	0	0	0	0	0	1
OF-RS-4-S	0	0	0	0	0	1
OF-RS-5-S	0	0	0	0	0	1
OF-RS-6-N	0	0	0	0	0	1
OF-RS-7-S	0	0	0	0	0	1
OF-RS-8-N	0	0	0	0	0	1
OF-RS-9-N	0	0	0	0	0	1

REVIEWED

Table 5A: Conduits

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C1	CB105	CB104		263.405	0.014	0	0	0	0	0.5	0	0	0	NO
C10	J20	J23		207.904	0.014	0	0	0	0	0.5	0	0	0	NO
C1046	J1414	J358	2D_Winthrop	25.153	0.011	0	0	0	0	0	0	0	0	NO
C1075	J1394	J358	2D_Winthrop	19.627	0.011	0	0	0	0	0	0	0	0	NO
C1076	J1371	J358	2D_Winthrop	22.144	0.011	0	0	0	0	0	0	0	0	NO
C11	CB4	CB3		28.475	0.014	0	0	0	0	0.5	0	0	0	NO
C1106	J1372	J359	2D_Winthrop	26.203	0.011	0	0	0	0	0	0	0	0	NO
C111	J66	J445		263.845	0.011	0	0	0	0	0	0	0	0	NO
C1146	J1372	J350	2D_Winthrop	26.17	0.011	0	0	0	0	0	0	0	0	NO
C1192	J1371	J350	2D_Winthrop	21.554	0.011	0	0	0	0	0	0	0	0	NO
C12	CB3	CB2		48.17	0.014	0	0	0	0	0.5	0	0	0	NO
C1202	J1350	J350	2D_Winthrop	16.278	0.011	0	0	0	0	0	0	0	0	NO
C13	CB2	CB1		25.561	0.014	0	0	0	0	0.5	0	0	0	NO
C16	MH5	CB6		111.613	0.014	0	0	0	0	0.5	0	0	0	NO
C17	CB6	MH3		140.635	0.014	0	0	0	0	0.5	0	0	0	NO
C18	MH18	WinthropPond	Zone6	525.428	0.01	0	0	0	0	0	0	0	0	NO
C2	CB104	CB112		471.237	0.014	0	0	0	0	0.5	0	0	0	NO
C2192	J1128	J207	2D_Court	26.183	0.011	0	0	0	0	0	0	0	0	NO
C2193	J1128	J206	2D_Court	23.535	0.011	0	0	0	0	0	0	0	0	NO
C2201	J1129	J207	2D_Court	23.818	0.011	0	0	0	0	0	0	0	0	NO
C2215	J1127	J206	2D_Court	22.139	0.011	0	0	0	0	0	0	0	0	NO
C2268	J1109	J206	2D_Court	23.545	0.011	0	0	0	0	0	0	0	0	NO
C2302	J1094	J206	2D_Court	25.776	0.011	0	0	0	0	0	0	0	0	NO
C2325	J1094	J199	2D_Court	21.342	0.011	0	0	0	0	0	0	0	0	NO
C2386	J1073	J199	2D_Court	20.667	0.011	0	0	0	0	0	0	0	0	NO
C2406	J189	J199	2D_Court	24.248	0.15	0	0	0	0	0	0	0	0	NO

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C27	J23	OF-RS-2-N		16.68	0.014	0	0	0	0	0.5	0	0	0	NO
C3	CB112	MH4		247.996	0.014	0	0	0	0	0.5	0	0	0	NO
C31	CB36	J32		47.227	0.014	0	0	0	0	0.5	0	0	0	NO
C32	CB23	CB34		62.955	0.011	0	0	0	0	0.5	0	0	0	NO
C33	CB24	WinthropPond	Zone6	88.47	0.011	0	0	0	0	0.5	0	0	0	NO
C34	CB34	CB24		44.772	0.011	0	0	0	0	0.5	0	0	0	NO
C37	CB30	DW#9		15.234	0.014	0	0	0	0	0.5	0	0	0	NO
C38	CB29	DW#9		20.886	0.014	0	0	0	0	0.5	0	0	0	NO
C39	CB27	MH18		54.24	0.014	0	0	0	0	0.5	0	0	0	NO
C4	MH4	CB101		119.245	0.014	0	0	0	0	0.5	0	0	0	NO
C40	MH8	MH9		25.283	0.014	0	0	0	0	0.5	0	0	0	NO
C41	MH9	MH10		23.109	0.014	0	0	0	0	0.5	0	0	0	NO
C42	MH10	MH18		39.24	0.014	0	0	0	0	0.5	0	0	0	NO
C43	CB33	MH18		40.72	0.014	0	0	0	0	0.5	0	0	0	NO
C44	CB28	MH18		27.307	0.014	0	0	0	0	0.5	0	0	0	NO
C45	MH11	MH18		122.435	0.014	0	0	0	0	0.5	0	0	0	NO
C46	MH12	MH11		84.66	0.014	0	0	0	0	0.5	0	0	0	NO
C464	J422	J421	2D_SouthShankPainter	29.38	0.15	0	0	0	0	0	0	0	0	NO
C47	CB31	MH11		13.987	0.014	0	0	0	0	0.5	0	0	0	NO
C472	J410	J421	2D_SouthShankPainter	27.713	0.15	0	0	0	0	0	0	0	0	NO
C48	CB32	MH11		53.849	0.014	0	0	0	0	0.5	0	0	0	NO
C49	MH14	MH13		212.01	0.014	0	0	0	0	0.5	0	0	0	NO
C5	CB101	MH3		43.639	0.014	0	0	0	0	0.5	0	0	0	NO
C50	MH13	MH12		219.97	0.014	0	0	0	0	0.5	0	0	0	NO
C51	MH16	MH15		116.201	0.014	0	0	0	0	0.5	0	0	0	NO
C512	J410	J409	2D_SouthShankPainter	27.174	0.15	0	0	0	0	0	0	0	0	NO

HERO

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C52	MH15	MH18		432.199	0.014	0	0	0	0	0.5	0	0	0	NO
C53	MH17	MH16		134.35	0.014	0	0	0	0	0.5	0	0	0	NO
C54	CB37	CB36		48.25	0.014	0	0	0	0	0.5	0	0	0	NO
C5450	DW8_CB	CourtStWetlandArea	Zone4	83.766	0.024	4.41	4.06	0	0	0	0	0	0	NO
C5451	J100	CourtStWetlandArea	Zone4	185.585	0.011	0	0	0	0	0	0	0	0	NO
C5452	CB1	MH1		12.777	0.014	0	0	0	0	0	0	0	0	NO
C5453	MH1	OF-SP-1-WJ		20.094	0.014	0	0	0	0	0	0	0	0	NO
C5454	MH2	MH1		190.137	0.014	0	0	0	0	0	0	0	0	NO
C5455	MH3	MH2		114.494	0.014	0	0	0	0	0	0	0	0	NO
C547	J1551	J409	2D_SouthShankPainter	22.535	0.011	0	0	0	0	0	0	0	0	NO
C55	CB38	CB37		20.613	0.014	0	0	0	0	0.5	0	0	0	NO
C56	CB35	J32		19.765	0.014	0	0	0	0	0.5	0	0	0	NO
C57	J18	OF-RS-1-N		45.993	0.014	0	0	0	0	0.5	0	0	0	NO
C58	J22	J23		125.62	0.014	0	0	0	0	0.5	0	0	0	NO
C59	J11	J13		35.428	0.014	0	0	0	0	0.5	0	0	0	NO
C60	J13	OF-RS-3-N		122.618	0.014	0	0	0	0	0.5	0	0	0	NO
C605	J1539	J397	2D_SouthShankPainter	26.212	0.011	0	0	0	0	0	0	0	0	NO
C607	J1527	J397	2D_SouthShankPainter	26.943	0.011	0	0	0	0	0	0	0	0	NO
C61	J5	J8		70.68	0.014	0	0	0	0	0.5	0	0	0	NO
C62	J8	OF-RS-4-S		67.751	0.014	0	0	0	0	0.5	0	0	0	NO
C6389	DW1_CB	DW1		15	0.01	0	0	0	0	0	0	0	0	NO
C64	J4	J7		70.823	0.014	0	0	0	0	0.5	0	0	0	NO
C65	J7	OF-RS-5-S		67.331	0.014	0	0	0	0	0.5	0	0	0	NO
C650	J1510	J389	2D_SouthShankPainter	18.564	0.011	0	0	0	0	0	0	0	0	NO
C66	J3	J1		75.518	0.014	0	0	0	0	0.5	0	0	0	NO
C67	J1	OF-RS-6-N	Zone1	64.921	0.014	0	0	0	0	0.5	0	0	0	NO

HERD

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C68	J6	J2		76.875	0.014	0	0	0	0	0.5	0	0	0	NO
C6814	J445	J611		301.421	0.011	0	0	0	0	0	0	0	0	NO
C6815	J611	J564		169.498	0.011	0	0	0	0	0	0	0	0	NO
C6816	J564	J661		29.034	0.011	0	0	0	0	0	0	0	0	NO
C69	J2	OF-RS-11-N	Zone1	52.784	0.014	0	0	0	0	0.5	0	0	0	NO
C70	J9	J10		77.687	0.014	0	0	0	0	0.5	0	0	0	NO
C71	J10	OF-RS-10-S	Zone1	69.271	0.014	0	0	0	0	0.5	0	0	0	NO
C7140	DW2_CB	DW2		15	0.01	0	0	0	0	0	0	0	0	NO
C7141	DW3/CB_CB	DW3/CB		15	0.01	0	0	0	0	0	0	0	0	NO
C7142	DW5_CB	DW5		15	0.01	0	0	0	0	0	0	0	0	NO
C7143	DW6_CB	DW6		15	0.01	0	0	0	0	0	0	0	0	NO
C7144	DW7_CB	DW7		15	0.01	0	0	0	0	0	0	0	0	NO
C7145	DW8_CB	DW8		15	0.01	0	0	0	0	0	0	0	0	NO
C7146	DW4/CB_CB	DW4/CB		15	0.01	0	0	0	0	0	0	0	0	NO
C7147	OF-SP-1-WJ	DuckPond	Zone2	20	0.014	0	0	0	0	0.5	0	0.5	0	NO
C72	J17	J16		75.234	0.014	0	0	0	0	0.5	0	0	0	NO
C73	J16	OF-RS-9-N	Zone1	53.115	0.014	0	0	0	0	0.5	0	0	0	NO
C74	J15	J14		75.097	0.014	0	0	0	0	0.5	0	0	0	NO
C75	J14	OF-RS-8-N	Zone1	60.067	0.014	0	0	0	0	0.5	0	0	0	NO
C76	J25	J26		70.204	0.014	0	0	0	0	0.5	0	0	0	NO
C77	J26	OF-RS-7-S	Zone1	74.453	0.014	0	0	0	0	0.5	0	0	0	NO
C78	J31	J30		52.913	0.014	0	0	0	0	0.5	0	0	0	NO
C79	J30	OF-RS-13-S	Zone1	50.854	0.014	0	0	0	0	0.5	0	0	0	NO
C80	J27	J28		84.437	0.014	0	0	0	0	0.5	0	0	0	NO
C81	J28	J32	Zone1	401.87	0.014	0	0	0	0	0.5	0	0	0	NO
C82	J29	J28		113.251	0.014	0	0	0	0	0.5	0	0	0	NO

HELD

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C83	J32	OF-RS-12-N	Zone1	21.49	0.014	0	0	0	0	0.5	0	0	0	NO
C9	J12	J20		67.86	0.014	0	0	0	0	0.5	0	0	0	NO

Table 5B: Conduits

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Exit Loss Coeff.	Avg. Loss Coeff.	Max. |Flow| (cfs)
C1	CIRCULAR	1	0	0	0	1				NO		NO	0.02313	0	0	3.41
C10	CIRCULAR	1	0	0	0	1				NO		NO	0.03851	0	0	1.91
C1046	RECT_OPEN	30	19.348	2	0	1				NO		NO	0.05722	0	0	0
C1075	RECT_OPEN	30	16.356	2	0	1				NO		NO	0.04938	0	0	0
C1076	RECT_OPEN	30	17.034	2	0	1				NO		NO	0.04684	0	0	0
C11	CIRCULAR	1	0	0	0	1				NO		NO	0.00808	0	0	0.01
C1106	RECT_OPEN	30	18.716	2	0	1				NO		NO	0.04087	0	0	0
C111	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.01404	0	0	0
C1146	RECT_OPEN	30	18.693	2	0	1				NO		NO	0.04092	0	0	0
C1192	RECT_OPEN	30	17.962	2	0	1				NO		NO	0.04812	0	0	0
C12	CIRCULAR	1	0	0	0	1				NO		NO	0.00104	0	0	0.02
C1202	RECT_OPEN	30	12.521	2	0	1				NO		NO	0.0484	0	0	2.56
C13	CIRCULAR	1	0	0	0	1				NO		NO	0.01956	0	0	1.38
C16	CIRCULAR	1	0	0	0	1				NO		NO	0.00332	0	0	0.41
C17	CIRCULAR	1	0	0	0	1				NO		NO	0.00711	0	0	2.72
C18	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00784	0	0	11.78
C2	CIRCULAR	1	0	0	0	1				NO		NO	0.00541	0	0	2.81
C2192	RECT_OPEN	30	18.702	2	0	1				NO		NO	0.11725	0	0	0.01

Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C2193	RECT_OPEN	30	18.104	2	0	1				NO		NO	0.13065	0.01
C2201	RECT_OPEN	30	19.848	2	0	1				NO		NO	0.0917	0.01
C2215	RECT_OPEN	30	17.03	2	0	1				NO		NO	0.20692	0.03
C2268	RECT_OPEN	30	19.621	2	0	1				NO		NO	0.26381	0.06
C2302	RECT_OPEN	30	19.828	2	0	1				NO		NO	0.26004	0.36
C2325	RECT_OPEN	30	17.785	2	0	1				NO		NO	0.31905	0.35
C2386	RECT_OPEN	30	17.222	2	0	1				NO		NO	0.35436	4.64
C2406	RECT_OPEN	30	20.207	2	0	1				NO		NO	0.32717	1.76
C27	CIRCULAR	1	0	0	0	1				NO		NO	0.04441	2.4
C3	CIRCULAR	1	0	0	0	1				NO		NO	0.00464	3.11
C31	CIRCULAR	1	0	0	0	1				NO		NO	0.03157	0.67
C32	CIRCULAR	1	0	0	0	1				NO		NO	0.0108	1.28
C33	CIRCULAR	1	0	0	0	1				NO		NO	0.01798	1.88
C34	CIRCULAR	1	0	0	0	1				NO		NO	0.00156	1.83
C37	CIRCULAR	1	0	0	0	1				NO		NO	0.28829	0.61
C38	CIRCULAR	1	0	0	0	1				NO		NO	0.18151	0.61
C39	CIRCULAR	1	0	0	0	1				NO		NO	0.04392	0.25
C4	CIRCULAR	1	0	0	0	1				NO		NO	0.01048	4.01
C40	CIRCULAR	1	0	0	0	1				NO		NO	0.00435	0
C41	CIRCULAR	1	0	0	0	1				NO		NO	-0.00606	0
C42	CIRCULAR	1	0	0	0	1				NO		NO	0.06692	0.04
C43	CIRCULAR	1	0	0	0	1				NO		NO	-0.00172	7.18
C44	CIRCULAR	1	0	0	0	1				NO		NO	-0.00439	0.62
C45	CIRCULAR	1	0	0	0	1				NO		NO	0.01944	3.76
C46	CIRCULAR	1	0	0	0	1				NO		NO	0.0473	2.8
C464	RECT_OPEN	30	20.986	2	0	1				NO		NO	0.11675	0.04

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Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C47	CIRCULAR	1	0	0	0	1				NO		NO	0.06088	0.14
C472	RECT_OPEN	30	23.094	2	0	1				NO		NO	0.10717	0.21
C48	CIRCULAR	1	0	0	0	1				NO		NO	0.0039	0.94
C49	CIRCULAR	0.833	0	0	0	1				NO		NO	0.03304	0.42
C5	CIRCULAR	1	0	0	0	1				NO		NO	0.01146	4.05
C50	CIRCULAR	1	0	0	0	1				NO		NO	0.05463	1.53
C51	CIRCULAR	1	0	0	0	1				NO		NO	0.0043	1.28
C512	RECT_OPEN	30	20.903	2	0	1				NO		NO	0.17295	0.37
C52	CIRCULAR	1	0	0	0	1				NO		NO	0.04489	1.55
C53	CIRCULAR	1	0	0	0	1				NO		NO	0.02189	0.32
C54	CIRCULAR	1	0	0	0	1				NO		NO	0.00497	0.47
C5450	CIRCULAR	1	0	0	0	1				NO		NO	0.07073	0.62
C5451	CIRCULAR	1	0	0	0	1				NO		NO	0.00167	2.66
C5452	CIRCULAR	1	0	0	0	1				NO		NO	0.06667	1.36
C5453	CIRCULAR	1	0	0	0	1				NO		NO	0.00299	6.62
C5454	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00447	5.84
C5455	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00437	5.85
C547	RECT_OPEN	30	17.335	2	0	1				NO		NO	0.19457	3.2
C55	CIRCULAR	1	0	0	0	1				NO		NO	0.03009	0.47
C56	CIRCULAR	1	0	0	0	1				NO		NO	0.06388	0
C57	CIRCULAR	1	0	0	0	1				NO		NO	0.03416	0.66
C58	CIRCULAR	1	0	0	0	1				NO		NO	0.05181	0.51
C59	CIRCULAR	1	0	0	0	1				NO		NO	0.00847	0.96
C60	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01085	2.21
C605	RECT_OPEN	30	20.163	2	0	1				NO		NO	0.15568	0.21
C607	RECT_OPEN	30	19.245	2	0	1				NO		NO	0.14871	0.03

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Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C61	CIRCULAR	1	0	0	0	1				NO		NO	0.0099	0.02
C62	CIRCULAR	1	0	0	0	1				NO		NO	0.17455	0.95
C6389	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.09
C64	CIRCULAR	1	0	0	0	1				NO		NO	0.02401	0.5
C65	CIRCULAR	1	0	0	0	1				NO		NO	0.20909	1.07
C650	RECT_OPEN	30	15.47	2	0	1				NO		NO	0.05216	0
C66	CIRCULAR	1	0	0	0	1				NO		NO	0.00397	0.39
C67	CIRCULAR	1	0	0	0	1				NO		NO	0.02666	0.65
C68	CIRCULAR	1	0	0	0	1				NO		NO	0.00781	0.79
C6814	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00739	1.37
C6815	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00493	4.43
C6816	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00696	4.81
C69	CIRCULAR	1	0	0	0	1				NO		NO	0.05236	0.79
C70	CIRCULAR	1	0	0	0	1				NO		NO	0.01287	0
C71	CIRCULAR	1	0	0	0	1				NO		NO	0.10685	0.46
C7140	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.19
C7141	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.04
C7142	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.15
C7143	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.64
C7144	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.62
C7145	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.49
C7146	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.04
C7147	CIRCULAR	1.5	0	0	0	1				NO		NO	0.03352	6.62
C72	CIRCULAR	1	0	0	0	1				NO		NO	0.00798	0.3
C73	CIRCULAR	1	0	0	0	1				NO		NO	0.03523	0.3
C74	CIRCULAR	1	0	0	0	1				NO		NO	0.00266	0.59

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Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C75	CIRCULAR	1	0	0	0	1				NO		NO	0.04867	0.59
C76	CIRCULAR	1	0	0	0	1				NO		NO	0.0057	0.43
C77	CIRCULAR	1	0	0	0	1				NO		NO	0.06663	1.51
C78	CIRCULAR	1	0	0	0	1				NO		NO	0.00567	4.7
C79	CIRCULAR	1	0	0	0	1				NO		NO	0.01337	7.62
C80	CIRCULAR	1	0	0	0	1				NO		NO	0.01149	0.43
C81	CIRCULAR	1	0	0	0	1				NO		NO	0.01911	1.75
C82	CIRCULAR	1	0	0	0	1				NO		NO	0.00327	1.64
C83	CIRCULAR	1	0	0	0	1				NO		NO	0.04658	2.41
C9	CIRCULAR	1	0	0	0	1				NO		NO	0.00737	1.11

Table 5C: Conduits

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C1	10/31/2018 12:26 PM	4.34	0.68	1	0			1	0	0	0	0
C10	10/31/2018 12:05 PM	6.07	0.29	0.42	0			1	0	0	0	0
C1046	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C1075	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C1076	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C11	10/31/2018 12:05 PM	0.06	0	0.28	0			1	0	0	0	0
C1106	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C111	10/31/2018 00:00 AM	0	0	0.05	0			1	0	0	0	0
C1146	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C1192	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0

Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C12	10/31/2018 12:05 PM	0.09	0.02	0.41	0			1	0	0	0	0
C1202	10/31/2018 12:20 PM	2.97	0	0.01	0			1	0	0	0	0
C13	10/31/2018 12:05 PM	5.65	0.3	0.59	0			1	0	0	0	0
C16	10/31/2018 12:06 PM	0.93	0.22	1	0			1	0	0	0	0
C17	10/31/2018 12:06 PM	3.47	0.98	1	0			1	0	0	0	0
C18	10/31/2018 12:02 PM	6.81	0.97	1	0			1	0	0	0	0
C2	10/31/2018 12:44 PM	3.58	1.15	1	0			1	0	0	0	0
C2192	10/31/2018 12:09 PM	0.02	0	0	0			1	0	0	0	0
C2193	10/31/2018 12:09 PM	0	0	0.01	0			1	0	0	0	0
C2201	10/31/2018 01:40 AM	0.01	0	0	0			1	0	0	0	0
C2215	10/31/2018 12:08 PM	0.01	0	0.01	0			1	0	0	0	0
C2268	10/31/2018 12:07 PM	0.02	0	0.01	0			1	0	0	0	0
C2302	10/31/2018 12:06 PM	0.14	0	0.01	0			1	0	0	0	0
C2325	10/31/2018 12:06 PM	0.09	0	0.01	0			1	0	0	0	0
C2386	10/31/2018 12:06 PM	1.2	0	0.01	0			1	0	0	0	0
C2406	10/31/2018 12:06 PM	0.35	0	0.01	0			1	0	0	0	0
C27	10/31/2018 12:05 PM	7.25	0.34	0.44	0			1	0	0	0	0
C3	10/31/2018 12:45 PM	3.95	1.38	1	0			1	0	0	0	0
C31	10/31/2018 12:05 PM	2.88	0.11	0.34	0			1	0	0	0	0
C32	10/31/2018 12:05 PM	2.77	0.29	0.9	0			1	0	0	0	0
C33	10/31/2018 12:05 PM	2.4	0.33	1	0			1	0	0	0	0
C34	10/31/2018 12:05 PM	3.74	1.1	1	0			1	0	0	0	0
C37	10/31/2018 12:05 PM	0.78	0.03	1	0			1	0	0	0	0
C38	10/31/2018 12:05 PM	0.78	0.04	1	0			1	0	0	0	0
C39	10/31/2018 12:03 PM	0.55	0.04	0.57	0			1	0	0	0	0
C4	10/31/2018 12:20 PM	5.11	1.18	1	0			1	0	0	0	0

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Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C40	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C41	10/31/2018 12:04 PM	0	0	0	0			1	0	0	0	0
C42	10/31/2018 12:03 PM	0.09	0	0.5	0			1	0	0	0	0
C43	10/31/2018 11:58 AM	9.14	5.24	1	0			1	0	0	0	0
C44	10/31/2018 12:03 PM	0.79	0.28	1	0			1	0	0	0	0
C45	10/31/2018 12:05 PM	4.88	0.82	1	0			1	0	0	0	0
C46	10/31/2018 12:05 PM	5.95	0.39	0.72	0			1	0	0	0	0
C464	10/31/2018 12:07 PM	0.13	0	0	0			1	0	0	0	0
C47	10/31/2018 12:05 PM	0.28	0.02	0.83	0			1	0	0	0	0
C472	10/31/2018 12:08 PM	0.31	0	0	0			1	0	0	0	0
C48	10/31/2018 12:06 PM	1.73	0.46	1	0			1	0	0	0	0
C49	10/31/2018 12:05 PM	3.13	0.11	0.29	0			1	0	0	0	0
C5	10/31/2018 12:29 PM	5.16	1.14	1	0			1	0	0	0	0
C50	10/31/2018 12:05 PM	5.84	0.2	0.37	0			1	0	0	0	0
C51	10/31/2018 12:05 PM	3.88	0.59	0.44	0			1	0	0	0	0
C512	10/31/2018 12:07 PM	0.1	0	0.02	0			1	0	0	0	0
C52	10/31/2018 12:05 PM	2.82	0.22	0.66	0			1	0	0	0	0
C53	10/31/2018 12:05 PM	1.24	0.07	0.36	0			1	0	0	0	0
C54	10/31/2018 12:10 PM	2.78	0.2	0.27	0			1	0	0	0	0
C5450	10/31/2018 12:07 PM	4.41	0.12	0.23	0			1	0	0	0	0
C5451	10/31/2018 11:57 AM	3.39	1.55	1	0			1	0	0	0	0
C5452	10/31/2018 12:05 PM	2.32	0.16	0.9	0			1	0	0	0	0
C5453	10/31/2018 12:15 PM	8.65	3.66	0.94	0			1	0	0	0	0
C5454	10/31/2018 12:18 PM	4.76	1.46	1	0			1	0	0	0	0
C5455	10/31/2018 12:17 PM	4.76	1.47	1	0			1	0	0	0	0
C547	10/31/2018 12:07 PM	1.15	0	0.02	0			1	0	0	0	0

Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C55	10/31/2018 12:10 PM	2.98	0.08	0.25	0			1	0	0	0	0
C56	10/31/2018 00:00 AM	0	0	0.23	0			1	0	0	0	0
C57	10/31/2018 12:05 PM	4.96	0.11	0.23	0			1	0	0	0	0
C58	10/31/2018 12:05 PM	2.31	0.07	0.32	0			1	0	0	0	0
C59	10/31/2018 12:05 PM	2.72	0.32	0.46	0			1	0	0	0	0
C60	10/31/2018 12:05 PM	4.49	0.22	0.32	0			1	0	0	0	0
C605	10/31/2018 12:07 PM	0.37	0	0.02	0			1	0	0	0	0
C607	10/31/2018 12:08 PM	0.05	0	0.02	0			1	0	0	0	0
C61	10/31/2018 14:50 PM	0.89	0	0.09	0			1	0	0	0	0
C62	10/31/2018 12:10 PM	9.93	0.07	0.18	0			1	0	0	0	0
C6389	10/31/2018 12:05 PM	0.22	0.01	1	0			1	0	0	0	0
C64	10/31/2018 12:05 PM	4.41	0.1	0.2	0			1	0	0	0	0
C65	10/31/2018 12:05 PM	10.92	0.07	0.18	0			1	0	0	0	0
C650	10/31/2018 12:23 PM	0	0	0	0			1	0	0	0	0
C66	10/31/2018 12:05 PM	2.28	0.19	0.27	0			1	0	0	0	0
C67	10/31/2018 12:05 PM	4.55	0.12	0.24	0			1	0	0	0	0
C68	10/31/2018 12:10 PM	4.01	0.27	0.3	0			1	0	0	0	0
C6814	10/31/2018 12:27 PM	0.91	0.02	0.15	0			1	0	0	0	0
C6815	10/31/2018 12:25 PM	2.15	0.08	0.21	0			1	0	0	0	0
C6816	10/31/2018 12:24 PM	2.76	0.07	0.17	0			1	0	0	0	0
C69	10/31/2018 12:10 PM	6.11	0.1	0.22	0			1	0	0	0	0
C70	10/31/2018 00:00 AM	0	0	0.07	0			1	0	0	0	0
C71	10/31/2018 12:05 PM	6.75	0.04	0.14	0			1	0	0	0	0
C7140	10/31/2018 12:15 PM	1.01	0.01	1	0			1	0	0	0	0
C7141	10/31/2018 12:05 PM	0.15	0	1	0			1	0	0	0	0
C7142	10/31/2018 12:05 PM	0.94	0.01	0.82	0			1	0	0	0	0

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Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C7143	10/31/2018 12:05 PM	0.82	0.04	1	0			1	0	0	0	0
C7144	10/31/2018 12:06 PM	0.79	0.04	1	0			1	0	0	0	0
C7145	10/31/2018 12:01 PM	0.62	0.03	1	0			1	0	0	0	0
C7146	10/31/2018 11:25 AM	0.17	0	1	0			1	0	0	0	0
C7147	10/31/2018 12:15 PM	14.28	0.37	0.31	0			1	0	0	0	0
C72	10/31/2018 12:05 PM	2.9	0.1	0.19	0			1	0	0	0	0
C73	10/31/2018 12:05 PM	4.02	0.05	0.15	0			1	0	0	0	0
C74	10/31/2018 12:05 PM	3.11	0.35	0.29	0			1	0	0	0	0
C75	10/31/2018 12:05 PM	5.49	0.08	0.19	0			1	0	0	0	0
C76	10/31/2018 12:05 PM	2.58	0.17	0.27	0			1	0	0	0	0
C77	10/31/2018 12:20 PM	8.01	0.18	0.29	0			1	0	0	0	0
C78	10/31/2018 12:18 PM	5.98	1.89	1	0			1	0	0	0	0
C79	10/31/2018 12:05 PM	9.71	1.99	1	0			1	0	0	0	0
C80	10/31/2018 12:20 PM	2.13	0.12	0.32	0			1	0	0	0	0
C81	10/31/2018 12:06 PM	5.24	0.38	0.44	0			1	0	0	0	0
C82	10/31/2018 12:05 PM	3.69	0.87	0.55	0			1	0	0	0	0
C83	10/31/2018 12:07 PM	7.51	0.34	0.43	0			1	0	0	0	0
C9	10/31/2018 12:05 PM	3.65	0.39	0.41	0			1	0	0	0	0

Table 5D: Conduits

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C1	AUTOMATIC	0.18	0.18	0.85	0.01	0.01	1	0.51	0.21	0.24	0.85	0	0
C10	AUTOMATIC	0	0	0	0	0	1	0.05	0.01	0.45	0.87	0	0
C1046	AUTOMATIC	0	0	0	0	0	1	0.26	0	0	0	0	0
C1075	AUTOMATIC	0	0	0	0	0	1	0.26	0	0	0	0	0
C1076	AUTOMATIC	0	0	0	0	0	1	0.26	0	0	0	0	0
C11	AUTOMATIC	0	0	0	0	0	1	0.71	0.01	0	0.74	0	0
C1106	AUTOMATIC	0	0	0	0	0	1	0.26	0	0	0	0	0
C111	AUTOMATIC	0	0	0	0	0	1	0.9	0	0	0	0	0
C1146	AUTOMATIC	0	0	0	0	0	1	0.26	0	0	0	0	0
C1192	AUTOMATIC	0	0	0	0	0	1	0.26	0	0	0	0	0
C12	AUTOMATIC	0	0	0	0	0	1	0.18	0.29	0	0.5	0	0
C1202	AUTOMATIC	0	0	0	0	0	1	0.26	0.74	0	0.74	0	0
C13	AUTOMATIC	0	0	0	0	0	1	0.18	0.51	0.31	0.01	0	0
C16	AUTOMATIC	0.46	0.46	0.55	0.01	0.01	1	0.67	0.32	0	0.78	0	0
C17	AUTOMATIC	0.55	0.55	0.91	0.01	0.04	1	0.56	0.33	0	0.79	0	0
C18	AUTOMATIC	0.22	0.22	36.14	0.01	0.01	1	0.03	0.8	0.17	0.81	0	0
C2	AUTOMATIC	0.85	0.85	0.92	0.67	0.69	1	0.06	0.47	0	0.85	0	0
C2192	AUTOMATIC	0	0	0	0	0	1	0.03	0.59	0	0.97	0	0
C2193	AUTOMATIC	0	0	0	0	0	1	0.03	0.59	0	0.97	0	0
C2201	AUTOMATIC	0	0	0	0	0	1	0.03	0.48	0	0.96	0	0
C2215	AUTOMATIC	0	0	0	0	0	1	0.03	0.84	0	0.97	0	0
C2268	AUTOMATIC	0	0	0	0	0	1	0.03	0.6	0	0.97	0	0
C2302	AUTOMATIC	0	0	0	0	0	1	0.03	0.61	0	0.97	0	0
C2325	AUTOMATIC	0	0	0	0	0	1	0.03	0.61	0	0.97	0	0
C2386	AUTOMATIC	0	0	0	0	0	1	0.03	0.97	0	0.97	0	0
C2406	AUTOMATIC	0	0	0	0	0	1	0.03	0.97	0	0.97	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C27	AUTOMATIC	0	0	0	0	0	1	0.05	0.49	0.45	0	0	0
C3	AUTOMATIC	0.85	0.92	0.89	0.68	0.6	1	0.09	0.88	0	0.59	0	0
C31	AUTOMATIC	0	0	0	0	0	1	0.08	0.26	0	0.76	0	0
C32	AUTOMATIC	0.01	0.01	35.91	0.01	0.01	1	0.1	0.9	0	0.15	0	0
C33	AUTOMATIC	35.9	35.9	36.5	0.01	0.01	1	0.04	0.89	0.01	0.15	0	0
C34	AUTOMATIC	35.9	35.91	35.9	0.09	0.08	1	0.1	0.86	0.04	0	0	0
C37	AUTOMATIC	41.46	41.46	44.17	0.01	0.01	1	0.04	0.96	0.01	0.09	0	0
C38	AUTOMATIC	41.67	41.67	44.17	0.01	0.01	1	0.04	0.95	0	0.07	0	0
C39	AUTOMATIC	0.01	0.01	0.43	0.01	0.01	1	0.03	0.95	0	0.97	0	0
C4	AUTOMATIC	0.88	0.89	0.92	0.75	0.81	1	0.11	0.59	0.31	0.56	0	0
C40	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C41	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0.75	0	0
C42	AUTOMATIC	0.01	0.01	35.94	0.01	0.01	1	0.03	0	0	0.75	0	0
C43	AUTOMATIC	0.43	0.43	0.91	1.51	0.01	1	0.03	0.97	0	0.01	0	0
C44	AUTOMATIC	0.43	0.43	0.52	0.01	0.01	1	0.03	0.97	0	0.01	0	0
C45	AUTOMATIC	0.06	0.06	0.43	0.01	0.01	1	0.03	0.47	0.01	0.95	0	0
C46	AUTOMATIC	0.01	0.01	0.06	0.01	0.01	1	0.52	0.01	0.47	0.97	0	0
C464	AUTOMATIC	0	0	0	0	0	1	0.62	0.02	0	0.75	0	0
C47	AUTOMATIC	0.01	0.01	0.06	0.01	0.01	1	0.52	0	0	0.75	0	0
C472	AUTOMATIC	0	0	0	0	0	1	0.61	0.35	0	0.5	0	0
C48	AUTOMATIC	0.04	0.04	0.06	0.01	0.01	1	0.52	0.37	0	0.84	0	0
C49	AUTOMATIC	0	0	0	0	0	1	0.03	0.61	0.27	0.88	0	0
C5	AUTOMATIC	0.87	0.92	0.91	0.68	0.76	1	0.11	0.88	0.01	0.63	0	0
C50	AUTOMATIC	0	0	0	0	0	1	0.03	0.5	0.48	0.96	0	0
C51	AUTOMATIC	0	0	0	0	0	1	0.51	0.24	0.24	0.49	0	0
C512	AUTOMATIC	0	0	0	0	0	1	0.16	0.35	0	0.84	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C52	AUTOMATIC	0.01	0.01	0.43	0.01	0.01	1	0.03	0.49	0	0.97	0	0
C53	AUTOMATIC	0	0	0	0	0	1	0.52	0.48	0	0.97	0	0
C54	AUTOMATIC	0	0	0	0	0	1	0.24	0.66	0.1	0	0	0
C5450	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C5451	AUTOMATIC	36.15	36.15	36.18	1.59	0.18	1	0.03	0.96	0	0.15	0	0
C5452	AUTOMATIC	0.01	0.01	0.88	0.01	0.01	1	0.11	0.33	0	0.8	0	0
C5453	AUTOMATIC	0.01	0.88	0.01	1.92	0.01	1	0.11	0.59	0.3	0.07	0	0
C5454	AUTOMATIC	0.53	0.69	0.53	0.86	0.52	1	0.11	0.45	0	0.86	0	0
C5455	AUTOMATIC	0.69	0.73	0.69	0.89	0.69	1	0.55	0.44	0	0.57	0	0
C547	AUTOMATIC	0	0	0	0	0	1	0.16	0.84	0	0.84	0	0
C55	AUTOMATIC	0	0	0	0	0	1	0.25	0.51	0.25	0.74	0	0
C56	AUTOMATIC	0	0	0	0	0	1	0.08	0	0	0	0	0
C57	AUTOMATIC	0	0	0	0	0	1	0.16	0.5	0.35	0	0	0
C58	AUTOMATIC	0	0	0	0	0	1	0.05	0.35	0	0.85	0	0
C59	AUTOMATIC	0	0	0	0	0	1	0.19	0.81	0	0.78	0	0
C60	AUTOMATIC	0	0	0	0	0	1	0.19	0.5	0.31	0	0	0
C605	AUTOMATIC	0	0	0	0	0	1	0.16	0.5	0.01	0.84	0	0
C607	AUTOMATIC	0	0	0	0	0	1	0.16	0.28	0	0.84	0	0
C61	AUTOMATIC	0	0	0	0	0	1	0.23	0.25	0	0.74	0	0
C62	AUTOMATIC	0	0	0	0	0	1	0.23	0.49	0.28	0	0	0
C6389	AUTOMATIC	36.06	36.06	38.33	0.01	0.01	1	0.09	0.91	0	0.15	0	0
C64	AUTOMATIC	0	0	0	0	0	1	0.18	0.5	0.31	0.51	0	0
C65	AUTOMATIC	0	0	0	0	0	1	0.18	0.5	0.32	0.01	0	0
C650	AUTOMATIC	0	0	0	0	0	1	0.6	0.07	0.01	0.13	0	0
C66	AUTOMATIC	0	0	0	0	0	1	0.2	0.8	0.01	0.5	0	0
C67	AUTOMATIC	0	0	0	0	0	1	0.2	0.49	0.31	0	0	0

PRELIMINARY

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C68	AUTOMATIC	0	0	0	0	0	1	0.24	0.5	0.26	0.49	0	0
C6814	AUTOMATIC	0	0	0	0	0	1	0.61	0.1	0	0.74	0	0
C6815	AUTOMATIC	0	0	0	0	0	1	0.54	0.34	0.04	0.52	0	0
C6816	AUTOMATIC	0	0	0	0	0	1	0.54	0.19	0.25	0.15	0	0
C69	AUTOMATIC	0	0	0	0	0	1	0.24	0.49	0.27	0	0	0
C70	AUTOMATIC	0	0	0	0	0	1	0.22	0	0	0	0	0
C71	AUTOMATIC	0	0	0	0	0	1	0.22	0.5	0.29	0	0	0
C7140	AUTOMATIC	34.6	34.6	36.08	0.01	0.01	1	0.15	0.83	0.03	0.1	0	0
C7141	AUTOMATIC	35.47	35.47	37.77	0.01	0.01	1	0.03	0.97	0	0.22	0	0
C7142	AUTOMATIC	0.01	0.01	35.92	0.01	0.01	1	0.03	0.94	0.03	0.21	0	0
C7143	AUTOMATIC	36.03	36.03	37.35	0.01	0.01	1	0.03	0.93	0.04	0.2	0	0
C7144	AUTOMATIC	36.1	36.1	37.68	0.01	0.01	1	0.03	0.93	0.04	0.2	0	0
C7145	AUTOMATIC	36.53	36.53	38.32	0.01	0.01	1	0.03	0.96	0.01	0.19	0	0
C7146	AUTOMATIC	38.31	38.31	41.92	0.01	0.01	1	0.03	0.97	0	0.15	0	0
C7147	AUTOMATIC	0	0	0	0	0	1	0.11	0.18	0.27	0.54	0	0
C72	AUTOMATIC	0	0	0	0	0	1	0.11	0.55	0.34	0.5	0	0
C73	AUTOMATIC	0	0	0	0	0	1	0.11	0.5	0.39	0	0	0
C74	AUTOMATIC	0	0	0	0	0	1	0.07	0.89	0.04	0.49	0	0
C75	AUTOMATIC	0	0	0	0	0	1	0.08	0.49	0.43	0	0	0
C76	AUTOMATIC	0	0	0	0	0	1	0.22	0.27	0	0.75	0	0
C77	AUTOMATIC	0	0	0	0	0	1	0.22	0.47	0.3	0	0	0
C78	AUTOMATIC	0.6	0.6	0.6	0.6	0.6	1	0.05	0.35	0	0.69	0	0
C79	AUTOMATIC	0.37	0.6	0.37	0.6	0.37	1	0.06	0.56	0.38	0	0	0
C80	AUTOMATIC	0	0	0	0	0	1	0.06	0.37	0	0.81	0	0
C81	AUTOMATIC	0	0	0	0	0	1	0.06	0.66	0.29	0.64	0	0
C82	AUTOMATIC	0	0	0	0	0	1	0.06	0.29	0.01	0.62	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C83	AUTOMATIC	0	0	0	0	0	1	0.08	0.62	0.3	0	0	0
C9	AUTOMATIC	0	0	0	0	0	1	0.05	0.66	0.29	0.5	0	0

Table 5E: Conduits

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C1	0		0	0	0	0	0	0	0	0	0	0
C10	0		0	0	0	0	0	0	0	0	0	0
C1046	0		0	0	0	0	0	0	0	0	0	0
C1075	0		0	0	0	0	0	0	0	0	0	0
C1076	0		0	0	0	0	0	0	0	0	0	0
C11	0		0	0	0	0	0	0	0	0	0	0
C1106	0		0	0	0	0	0	0	0	0	0	0
C111	0		0	0	0	0	0	0	0	0	0	0
C1146	0		0	0	0	0	0	0	0	0	0	0
C1192	0		0	0	0	0	0	0	0	0	0	0
C12	0		0	0	0	0	0	0	0	0	0	0
C1202	0		0	0	0	0	0	0	0	0	0	0
C13	0		0	0	0	0	0	0	0	0	0	0
C16	0		0	0	0	0	0	0	0	0	0	0
C17	0		0	0	0	0	0	0	0	0	0	0
C18	0		0	0	0	0	0	0	0	0	0	0
C2	0		0	0	0	0	0	0	0	0	0	0
C2192	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C2193	0		0	0	0	0	0	0	0	0	0	0
C2201	0		0	0	0	0	0	0	0	0	0	0
C2215	0		0	0	0	0	0	0	0	0	0	0
C2268	0		0	0	0	0	0	0	0	0	0	0
C2302	0		0	0	0	0	0	0	0	0	0	0
C2325	0		0	0	0	0	0	0	0	0	0	0
C2386	0		0	0	0	0	0	0	0	0	0	0
C2406	0		0	0	0	0	0	0	0	0	0	0
C27	0		0	0	0	0	0	0	0	0	0	0
C3	0		0	0	0	0	0	0	0	0	0	0
C31	0		0	0	0	0	0	0	0	0	0	0
C32	0		0	0	0	0	0	0	0	0	0	0
C33	0		0	0	0	0	0	0	0	0	0	0
C34	0		0	0	0	0	0	0	0	0	0	0
C37	0		0	0	0	0	0	0	0	0	0	0
C38	0		0	0	0	0	0	0	0	0	0	0
C39	0		0	0	0	0	0	0	0	0	0	0
C4	0		0	0	0	0	0	0	0	0	0	0
C40	0		0	0	0	0	0	0	0	0	0	0
C41	0		0	0	0	0	0	0	0	0	0	0
C42	0		0	0	0	0	0	0	0	0	0	0
C43	0		0	0	0	0	0	0	0	0	0	0
C44	0		0	0	0	0	0	0	0	0	0	0
C45	0		0	0	0	0	0	0	0	0	0	0
C46	0		0	0	0	0	0	0	0	0	0	0
C464	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C47	0		0	0	0	0	0	0	0	0	0	0
C472	0		0	0	0	0	0	0	0	0	0	0
C48	0		0	0	0	0	0	0	0	0	0	0
C49	0		0	0	0	0	0	0	0	0	0	0
C5	0		0	0	0	0	0	0	0	0	0	0
C50	0		0	0	0	0	0	0	0	0	0	0
C51	0		0	0	0	0	0	0	0	0	0	0
C512	0		0	0	0	0	0	0	0	0	0	0
C52	0		0	0	0	0	0	0	0	0	0	0
C53	0		0	0	0	0	0	0	0	0	0	0
C54	0		0	0	0	0	0	0	0	0	0	0
C5450	0		0	0	0	0	0	0	0	0	0	0
C5451	0		0	0	0	0	0	0	0	0	0	0
C5452	0		0	0	0	0	0	0	0	0	0	0
C5453	0		0	0	0	0	0	0	0	0	0	0
C5454	0		0	0	0	0	0	0	0	0	0	0
C5455	0		0	0	0	0	0	0	0	0	0	0
C547	0		0	0	0	0	0	0	0	0	0	0
C55	0		0	0	0	0	0	0	0	0	0	0
C56	0		0	0	0	0	0	0	0	0	0	0
C57	0		0	0	0	0	0	0	0	0	0	0
C58	0		0	0	0	0	0	0	0	0	0	0
C59	0		0	0	0	0	0	0	0	0	0	0
C60	0		0	0	0	0	0	0	0	0	0	0
C605	0		0	0	0	0	0	0	0	0	0	0
C607	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C61	0		0	0	0	0	0	0	0	0	0	0
C62	0		0	0	0	0	0	0	0	0	0	0
C6389	0		0	0	0	0	0	0	0	0	0	0
C64	0		0	0	0	0	0	0	0	0	0	0
C65	0		0	0	0	0	0	0	0	0	0	0
C650	0		0	0	0	0	0	0	0	0	0	0
C66	0		0	0	0	0	0	0	0	0	0	0
C67	0		0	0	0	0	0	0	0	0	0	0
C68	0		0	0	0	0	0	0	0	0	0	0
C6814	0		0	0	0	0	0	0	0	0	0	0
C6815	0		0	0	0	0	0	0	0	0	0	0
C6816	0		0	0	0	0	0	0	0	0	0	0
C69	0		0	0	0	0	0	0	0	0	0	0
C70	0		0	0	0	0	0	0	0	0	0	0
C71	0		0	0	0	0	0	0	0	0	0	0
C7140	0		0	0	0	0	0	0	0	0	0	0
C7141	0		0	0	0	0	0	0	0	0	0	0
C7142	0		0	0	0	0	0	0	0	0	0	0
C7143	0		0	0	0	0	0	0	0	0	0	0
C7144	0		0	0	0	0	0	0	0	0	0	0
C7145	0		0	0	0	0	0	0	0	0	0	0
C7146	0		0	0	0	0	0	0	0	0	0	0
C7147	0		0	0	0	0	0	0	0	0	0	0
C72	0		0	0	0	0	0	0	0	0	0	0
C73	0		0	0	0	0	0	0	0	0	0	0
C74	0		0	0	0	0	0	0	0	0	0	0

Draft

Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C75	0		0	0	0	0	0	0	0	0	0	0
C76	0		0	0	0	0	0	0	0	0	0	0
C77	0		0	0	0	0	0	0	0	0	0	0
C78	0		0	0	0	0	0	0	0	0	0	0
C79	0		0	0	0	0	0	0	0	0	0	0
C80	0		0	0	0	0	0	0	0	0	0	0
C81	0		0	0	0	0	0	0	0	0	0	0
C82	0		0	0	0	0	0	0	0	0	0	0
C83	0		0	0	0	0	0	0	0	0	0	0
C9	0		0	0	0	0	0	0	0	0	0	0

Table 5F: Conduits

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C1	80.286	0	1
C10	63.364	0	1
C1046	14.82	0	1
C1075	8.808	0	1
C1076	11.283	0	1
C11	8.687	0	1
C1106	13.528	0	1
C111	80.426	0	1
C1146	16.208	0	1
C1192	11.719	0	1

Legacy

Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C12	14.69	0	1
C1202	7.334	0	1
C13	7.798	0	1
C16	34.026	0	1
C17	42.866	0	1
C18	160.147	0	1
C2	143.639	0	1
C2192	14.435	0	1
C2193	11.775	0	1
C2201	10.526	0	1
C2215	11.168	0	1
C2268	13.21	0	1
C2302	15.72	0	1
C2325	10.634	0	1
C2386	9.908	0	1
C2406	15.24	0	1
C27	5.088	0	1
C3	75.585	0	1
C31	14.395	0	1
C32	19.183	0	1
C33	26.965	0	1
C34	13.641	0	1
C37	4.651	0	1
C38	6.346	0	1
C39	16.539	0	1
C4	36.353	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C40	7.713	0	1
C41	7.051	0	1
C42	11.966	0	1
C43	12.41	0	1
C44	8.317	0	1
C45	37.311	0	1
C46	25.797	0	1
C464	15.06	0	1
C47	4.255	0	1
C472	15.24	0	1
C48	16.408	0	1
C49	64.613	0	1
C5	13.308	0	1
C50	67.039	0	1
C51	35.426	0	1
C512	15.241	0	1
C52	131.742	0	1
C53	40.957	0	1
C54	14.707	0	1
C5450	25.532	0	1
C5451	56.57	0	1
C5452	3.894	0	1
C5453	6.125	0	1
C5454	57.954	0	1
C5455	34.898	0	1
C547	11.883	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C55	6.283	0	1
C56	6.024	0	1
C57	18.673	0	1
C58	38.297	0	1
C59	10.812	0	1
C60	37.396	0	1
C605	15.431	0	1
C607	16.55	0	1
C61	21.536	0	1
C62	20.62	0	1
C6389	0.268	0	1
C64	21.578	0	1
C65	20.515	0	1
C650	8.842	0	1
C66	23.027	0	1
C67	19.796	0	1
C68	23.439	0	1
C6814	91.879	0	1
C6815	51.67	0	1
C6816	8.85	0	1
C69	16.096	0	1
C70	23.672	0	1
C71	21.106	0	1
C7140	0.285	0	1
C7141	0.095	0	1
C7142	0.134	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C7143	0.164	0	1
C7144	0.095	0	1
C7145	0.095	0	1
C7146	0.164	0	1
C7147	93.011	0	1
C72	22.939	0	1
C73	16.198	0	1
C74	22.898	0	1
C75	18.316	0	1
C76	21.39	0	1
C77	22.684	0	1
C78	16.12	0	1
C79	15.484	0	1
C80	25.75	0	1
C81	122.49	0	1
C82	34.523	0	1
C83	6.549	0	1
C9	20.69	0	1

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Table 6A: ARM Subcatchments

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)
S1	1010487.317	2847818.725			SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB2	0.913	300	3.519	0
S10	1005708.415	2844682.934	Set		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J20	0.352	300	8.406	0
S103_1	1007362.004	2845719.622	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J25	0.781	300	11.045	0
S103_2	1007058.318	2845579.838	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J1	0.636	300	14.154	0
S106	1011862.971	2845745.351	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH13	0.436	300	5.668	0
S11	1011368.787	2845042.386	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB30	0.24	300	11.124	0
S112	1011765.715	2845607.459	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH12	0.576	300	11.629	0
S117	1006645.061	2845292.582	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J8	1.279	300	7.392	0
S119	1011710.229	2845450.521	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB32	0.487	300	13.311	0
S12	1009155.269	2846806.185	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J28	1.163	300	11.343	0
S121	1006652.612	2845362.099	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J4	0.365	300	7.731	0
S122	1011582.402	2845423.142	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH11	0.033	300	5.762	0
S123_1	1011641.466	2845102.141	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB33	5.513	300	8.307	0
S126	1006771.027	2845326.81	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J7	0.373	300	8.112	0
S128_1	1011314.008	2844967.879	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB29	0.912	300	6.141	0
S128_3	1011439.667	2845206.557	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB27	0.082	300	5.357	0
S128_4	1011509.295	2845310.923	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	cb28	0.069	300	3.231	0
S13	1010995.082	2845155.655			SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J417	9.522	300	9.391	0
S130	1006150.145	2845207.413	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J5	1.595	300	27.808	0
S135	1006040.366	2844957.721	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J13	0.89	300	15.026	0
S135_2	1005799.316	2844651.484	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J12	0.528	300	15.451	0
S135_4	1005715.768	2844640.674	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J12	0.218	300	10.886	0
S138	1006093.058	2844885.605	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J11	0.718	300	12.176	0
S14	1010073.132	2846967.657			SCS Dimensionless UH	2yr24hr_NOAA_3.14in	OF-RS-13-S	8.285	300	10.506	0
S141	1011205.465	2844879.436	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH15	0.124	300	4.749	0
S2	1010278.468	2848203.067		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DuckPond	26.281	300	10.923	0

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Table 6A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)
S2_1	1010537.761	2846249.488		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CourtStWetlandArea	0.379	300	16.627	0
S2_3	1010958.977	2846249.347		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J1134	10.8	300	12.201	0
S23	1009578.801	2847171.57	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB36	0.524	300	10.193	0
S25	1010728.262	2847636.033		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH4	2.032	300	5.744	0
S26	1010339.144	2847226.967		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J110	0.546	300	3.813	0
S26_1	1010334.853	2847481.827		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH5	0.38	300	6.003	0
S26_2	1010265.57	2847510.507		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J30	2.305	300	6.225	0
S28	1010126.571	2847580.706		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J31	9.662	300	8.684	0
S30	1011355.912	2847415.335		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB104	4.405	300	11.115	0
S32	1010496.691	2847333.793		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB6	2.021	300	6.639	0
S33	1010881.808	2847329.337		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J611	8.854	300	10.761	0
S36	1011722.209	2847132.617		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB105	12.204	300	9.923	0
S46_2	1009603.012	2847123.201	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB37	0.538	300	4.62	0
S49_1	1010739.79	2846918.195		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J893	3.133	300	10.21	0
S49_2	1010372.03	2846602.463		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J975	1.131	300	12.177	0
S49_3	1010535.049	2846799.21		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J908	0.276	300	4.194	0
S49_4	1010640.175	2846724.247		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J935	2.232	300	9.012	0
S49_5	1010446.731	2846786.408		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J915	0.082	300	4.497	0
S49_6	1010444.732	2846453.095		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J1024	0.451	300	8.23	0
S49_8	1010511.018	2846349.272		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J189	0.18	300	4.348	0
S5	1011269.647	2845445.835		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	WinthropPond	1.084	300	5.645	0
S52_2	1009925.542	2847338.791	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J30	0.249	300	3.955	0
S53	1011172.364	2846593.041		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J121	3.103	300	17.273	0
S6	1005494.968	2844432.915	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J22	0.279	300	8.507	0
S6_1	1008971.765	2846458.918	Set		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J6	1.238	300	9.56	0
S6_3	1009439.368	2846742.738	Set		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J27	4.78	300	12.857	0

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Table 6A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)
S6_4	1009688.465	2847016.819	Set		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB38	1.549	300	10.774	0
S7	1011037.519	2844670.263	Set		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH17	0.125	300	9.11	0
S70_2	1010722.908	2845836.1		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J335	2.87	300	7.148	0
S75_2	1008589.068	2846300.144	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J6	1.627	300	11.794	0
S76_1	1011305.239	2845685.652		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J1353	5.302	300	12.888	0
S8	1005452.29	2844454.885			SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J18	0.372	300	7.857	0
S80_1	1010894.296	2845731.405		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB23	0.578	300	4.766	0
S9	1011213.411	2844798.075	Set		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH16	0.38	300	3.94	0
S90_1	1008157.655	2846015.314	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J17	0.138	300	5.266	0
S90_2	1008454.394	2846213.676	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J10	0.441	300	10.746	0
S97_2	1007093.128	2845499.64	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J3	0.299	300	6.44	0
S99_2	1007877.635	2845863.999	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J15	0.25	300	2.582	0
R1_1	-7814364.971	5169049.977	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J31	0.487	300	6.426	0
R3_1	-7813934.519	5168322.624		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB34	0.308	300	4.658	0
R3_3	-7813905.512	5168324.095		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB24	0.039	300	4.658	0
R3_4	-7813890.128	5168347.762		WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	WinthropPond	0.788	300	4.66	0
S98_3	-7813503.99	5168429.516	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH14	0.201	300	13.371	0
R4_1	-7815245.33	5168440.929	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J26	2.024	300	10.977	0
R4_2	-7815172.403	5168526.52	Set	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	OF-RS-9-N	0.479	300	10.988	0
R5	-7814662.994	5168936.48	Set		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J29	1.586	300	10.734	0

Table 6B: ARM Subcatchments

Name	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method	IA Method
S1	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.002	SCS CN	0.2 S
S10	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S103_1	0.05	11.618	3	0.5	4	7	0	1.93	4.739	0.413	User entered value	5	SCS CN	0.2 S
S103_2	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S106	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.041	SCS CN	0.2 S
S11	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S112	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S117	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.198	SCS CN	0.2 S
S119	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S12	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	6.7	SCS CN	0.2 S
S121	0.05	11.504	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S122	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S123_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S126	0.05	11.514	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.008	SCS CN	0.2 S
S128_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN	0.2 S
S128_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S128_4	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S13	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	10.3	SCS CN	0.2 S
S130	0.05	12.119	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.3	SCS CN	0.2 S
S135	0.05	11.577	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S135_2	0.05	11.529	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S135_4	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S138	0.05	11.53	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S14	0.05	12.22	3	0.5	4	7	0	1.982	4.347	0.41	User entered value	6.698	SCS CN	0.2 S
S141	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN	0.2 S
S2	0.05	12.46	3	0.5	4	7	0	2.868	2.723	0.397	User entered value	12.8	SCS CN	0.2 S

Table 6B: ARM Subcatchments (continued...)

Name	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method	IA Method
S2_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S2_3	0.05	11.581	3	0.5	4	7	0	2.396	1.208	0.39	User entered value	9.5	SCS CN	0.2 S
S23	0.05	11.5	3	0.5	4	7	0	1.932	4.728	0.413	User entered value	5	SCS CN	0.2 S
S25	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	13.9	SCS CN	0.2 S
S26	0.05	12.536	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S26_1	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S26_2	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.199	SCS CN	0.2 S
S28	0.05	11.835	3	0.5	4	7	0	2.257	4.036	0.407	User entered value	7.722	SCS CN	0.2 S
S30	0.05	11.99	3	0.5	4	7	0	2.008	4.151	0.409	User entered value	7.3	SCS CN	0.2 S
S32	0.05	11.5	3	0.5	4	7	0	1.944	4.631	0.412	User entered value	5.9	SCS CN	0.2 S
S33	0.05	11.93	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	15.1	SCS CN	0.2 S
S36	0.05	11.541	3	0.5	4	7	0	2.24	2.389	0.398	User entered value	24.9	SCS CN	0.2 S
S46_2	0.05	11.513	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S49_1	0.05	11.624	3	0.5	4	7	0	2.124	3.271	0.404	User entered value	17.8	SCS CN	0.2 S
S49_2	0.05	11.5	3	0.5	4	7	0	2.088	3.546	0.405	User entered value	5	SCS CN	0.2 S
S49_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S49_4	0.05	11.543	3	0.5	4	7	0	2.261	2.229	0.397	User entered value	5	SCS CN	0.2 S
S49_5	0.05	11.716	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S49_6	0.05	11.5	3	0.5	4	7	0	2.264	2.207	0.397	User entered value	5	SCS CN	0.2 S
S49_8	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S5	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S52_2	0.05	11.5	3	0.5	4	7	0	2.199	2.7	0.4	User entered value	5.001	SCS CN	0.2 S
S53	0.05	11.5	3	0.5	4	7	0	2.161	2.99	0.402	User entered value	5	SCS CN	0.2 S
S6	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S6_1	0.05	12.367	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.2	SCS CN	0.2 S
S6_3	0.05	12.239	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S

Table 6B: ARM Subcatchments (continued...)

Name	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method	IA Method
S6_4	0.05	11.509	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S7	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S70_2	0.05	11.504	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S75_2	0.05	12.11	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	8.2	SCS CN	0.2 S
S76_1	0.05	11.623	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	7.6	SCS CN	0.2 S
S8	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S80_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S9	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S90_1	0.05	12.035	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S90_2	0.05	11.63	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S97_2	0.05	11.726	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S99_2	0.05	11.942	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.244	SCS CN	0.2 S
R1_1	0.05	11.5	3	0.5	4	7	0	2.111	3.37	0.404	User entered value	5	SCS CN	0.2 S
R3_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
R3_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
R3_4	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN	0.2 S
S98_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
R4_1	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	27.172	SCS CN	0.2 S
R4_2	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
R5	0.05	12.229	3	0.5	4	7	0	2.154	3.045	0.402	User entered value	5	SCS CN	0.2 S

Table 6C: ARM Subcatchments

Name	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)	Roughness
S1	0.411	82.955	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S10	0.143	93.311	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S103_1	0.982	67.075	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S103_2	1.108	64.358	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S106	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S11	0.053	97.442	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S112	0.172	92.078	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S117	0.764	72.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S119	0.263	88.363	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S12	1.666	54.548	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S121	0.482	80.59	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S122	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S123_1	0.167	92.274	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S126	0.422	82.568	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S128_1	0.069	96.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S128_3	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S128_4	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S13	0.807	71.254	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S130	2.219	47.407	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S135	0.47	80.956	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S135_2	0.633	75.95	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S135_4	0.076	96.35	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S138	0.501	79.966	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S14	0.677	74.72	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S141	0.159	92.649	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S2	1.7	54.06	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1

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Table 6C: ARM Subcatchments (continued...)

Name	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)	Roughness
S2_1	1.622	55.211	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S2_3	0.628	76.097	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S23	1.119	64.122	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S25	0.429	82.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S26	0.139	93.496	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S26_1	0.496	80.121	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S26_2	0.432	82.234	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S28	0.881	69.412	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S30	1.372	59.304	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S32	0.51	79.692	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S33	0.979	67.134	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S36	1.122	64.068	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S46_2	2.758	42.031	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_1	0.278	87.78	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_2	0.44	81.972	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_3	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_4	0.294	87.166	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_5	0.045	97.821	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_6	0.25	88.899	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_8	0.121	94.296	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S5	0.412	82.903	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S52_2	0.193	91.184	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S53	0.547	78.512	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S6	0.309	86.616	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S6_1	2.363	45.842	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S6_3	1.641	54.929	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1

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Table 6C: ARM Subcatchments (continued...)

Name	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)	Roughness
S6_4	1.218	62.146	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S7	0.043	97.919	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S70_2	0.469	81.003	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S75_2	1	66.673	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S76_1	0.82	70.914	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S8	0.327	85.953	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S80_1	0.163	92.473	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S9	0.048	97.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S90_1	0.19	91.328	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S90_2	0.651	75.453	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S97_2	0.511	79.665	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S99_2	0.117	94.48	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R1_1	0.812	71.117	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R3_1	0.272	88.01	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R3_3	0.158	92.689	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R3_4	0.578	77.569	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S98_3	0.214	90.344	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R4_1	0.717	73.607	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R4_2	3.561	35.962	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R5	0.651	75.452	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1

Table 6D: ARM Subcatchments

Name	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)	Runoff Coefficient
S1	2017			No	0	0	0	0	3.137	1.583	1.569	0.039	1.416	0.5
S10	2017			No	0	0	0	0	3.137	0.722	2.439	0.023	0.814	0.777
S103_1	2017			No	0	0	0	0	3.137	2.48	0.664	0.014	0.427	0.212
S103_2	2017			No	0	0	0	0	3.137	2.593	0.55	0.009	0.258	0.175
S106	2017			No	0	0	0	0	3.137	0.232	2.933	0.035	1.116	0.935
S11	2017			No	0	0	0	0	3.137	0.294	2.87	0.019	0.61	0.915
S112	2017			No	0	0	0	0	3.137	0.839	2.32	0.036	1.282	0.74
S117	2017			No	0	0	0	0	3.137	2.228	0.909	0.032	0.955	0.29
S119	2017			No	0	0	0	0	3.137	1.167	1.989	0.026	0.951	0.634
S12	2017			No	0	0	0	0	3.137	2.917	0.225	0.007	0.095	0.072
S121	2017			No	0	0	0	0	3.137	1.745	1.406	0.014	0.505	0.448
S122	2017			No	0	0	0	0	3.137	0.232	2.933	0.003	0.085	0.935
S123_1	2017			No	0	0	0	0	3.137	0.821	2.338	0.35	12.351	0.745
S126	2017			No	0	0	0	0	3.137	1.61	1.542	0.016	0.568	0.492
S128_1	2017			No	0	0	0	0	3.137	0.38	2.783	0.069	2.287	0.887
S128_3	2017			No	0	0	0	0	3.137	0.232	2.932	0.007	0.21	0.935
S128_4	2017			No	0	0	0	0	3.137	0.232	2.932	0.005	0.177	0.935
S13	2017			No	0	0	0	0	3.137	2.284	0.846	0.219	6.448	0.27
S130	2017			No	0	0	0	0	3.137	3.067	0.071	0.003	0.015	0.023
S135	2017			No	0	0	0	0	3.137	1.72	1.43	0.035	1.253	0.456
S135_2	2017			No	0	0	0	0	3.137	2.032	1.116	0.016	0.565	0.356
S135_4	2017			No	0	0	0	0	3.137	0.413	2.75	0.016	0.543	0.877
S138	2017			No	0	0	0	0	3.137	1.786	1.364	0.027	0.961	0.435
S14	2017			No	0	0	0	0	3.137	2.101	1.058	0.238	7.796	0.337
S141	2017			No	0	0	0	0	3.137	0.785	2.375	0.008	0.281	0.757
S2	2017			No	0	0	0	0	3.137	2.929	0.207	0.148	1.727	0.066

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Table 6D: ARM Subcatchments (continued...)

Name	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)	Runoff Coefficient
S2_1	2017			No	0	0	0	0	3.137	2.899	0.241	0.002	0.036	0.077
S2_3	2017			No	0	0	0	0	3.137	2.023	1.111	0.326	10.156	0.354
S23	2017			No	0	0	0	0	3.137	2.602	0.54	0.008	0.206	0.172
S25	2017			No	0	0	0	0	3.137	1.625	1.506	0.083	2.515	0.48
S26	2017			No	0	0	0	0	3.137	0.704	2.457	0.036	1.269	0.783
S26_1	2017			No	0	0	0	0	3.137	1.776	1.374	0.014	0.513	0.438
S26_2	2017			No	0	0	0	0	3.137	1.633	1.503	0.094	2.988	0.479
S28	2017			No	0	0	0	0	3.137	2.373	0.783	0.205	6.021	0.25
S30	2017			No	0	0	0	0	3.137	2.776	0.37	0.044	0.855	0.118
S32	2017			No	0	0	0	0	3.137	1.803	1.344	0.074	2.591	0.428
S33	2017			No	0	0	0	0	3.137	2.477	0.655	0.158	3.901	0.209
S36	2017			No	0	0	0	0	3.137	2.604	0.533	0.177	3.446	0.17
S46_2	2017			No	0	0	0	0	3.137	3.127	0.01	0	0.001	0.003
S49_1	2017			No	0	0	0	0	3.137	1.215	1.924	0.164	4.574	0.613
S49_2	2017			No	0	0	0	0	3.137	1.651	1.5	0.046	1.674	0.478
S49_3	2017			No	0	0	0	0	3.137	0.232	2.932	0.022	0.707	0.935
S49_4	2017			No	0	0	0	0	3.137	1.264	1.891	0.115	4.159	0.603
S49_5	2017			No	0	0	0	0	3.137	0.252	2.912	0.006	0.21	0.928
S49_6	2017			No	0	0	0	0	3.137	1.121	2.035	0.025	0.899	0.649
S49_8	2017			No	0	0	0	0	3.137	0.625	2.536	0.012	0.428	0.808
S5	2017			No	0	0	0	0	3.137	1.586	1.566	0.046	1.677	0.499
S52_2	2017			No	0	0	0	0	3.137	0.921	2.237	0.015	0.538	0.713
S53	2017			No	0	0	0	0	3.137	1.878	1.271	0.107	3.845	0.405
S6	2017			No	0	0	0	0	3.137	1.308	1.846	0.014	0.508	0.589
S6_1	2017			No	0	0	0	0	3.137	3.09	0.048	0.002	0.008	0.015
S6_3	2017			No	0	0	0	0	3.137	2.907	0.233	0.03	0.431	0.074

HERD

Table 6D: ARM Subcatchments (continued...)

Name	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)	Runoff Coefficient
S6_4	2017			No	0	0	0	0	3.137	2.678	0.464	0.02	0.468	0.148
S7	2017			No	0	0	0	0	3.137	0.241	2.922	0.01	0.32	0.932
S70_2	2017			No	0	0	0	0	3.137	1.717	1.433	0.112	4.05	0.457
S75_2	2017			No	0	0	0	0	3.137	2.497	0.649	0.029	0.794	0.207
S76_1	2017			No	0	0	0	0	3.137	2.301	0.857	0.123	3.689	0.273
S8	2017			No	0	0	0	0	3.137	1.36	1.794	0.018	0.659	0.572
S80_1	2017			No	0	0	0	0	3.137	0.802	2.357	0.037	1.303	0.751
S9	2017			No	0	0	0	0	3.137	0.271	2.894	0.03	0.969	0.923
S90_1	2017			No	0	0	0	0	3.137	0.908	2.25	0.008	0.3	0.717
S90_2	2017			No	0	0	0	0	3.137	2.06	1.088	0.013	0.458	0.347
S97_2	2017			No	0	0	0	0	3.137	1.805	1.345	0.011	0.394	0.429
S99_2	2017			No	0	0	0	0	3.137	0.606	2.551	0.017	0.593	0.813
R1_1	2017			No	0	0	0	0	3.137	2.291	0.855	0.011	0.376	0.272
R3_1	2017			No	0	0	0	0	3.137	1.196	1.96	0.016	0.593	0.625
R3_3	2017			No	0	0	0	0	3.137	0.781	2.378	0.003	0.088	0.758
R3_4	2017			No	0	0	0	0	3.137	1.936	1.213	0.026	0.927	0.387
S98_3	2017			No	0	0	0	0	3.137	0.996	2.161	0.012	0.422	0.689
R4_1	2017			No	0	0	0	0	3.137	2.162	0.975	0.054	1.239	0.311
R4_2	2017			No	0	0	0	0	3.137	3.137	0	0	0	0
R5	2017			No	0	0	0	0	3.137	2.06	1.087	0.047	1.646	0.347

Table 6E: ARM Subcatchments

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S1	315.069	3688.787	1
S10	269.666	1423.459	1
S103_1	377.028	3159.303	1
S103_2	295.706	2574.745	1
S106	233.481	1631.88	1
S11	168.535	969.45	1
S112	307.634	2332.704	1
S117	712.861	5180.467	1
S119	179.431	1969.813	1
S12	494.459	4707.633	1
S121	270.8	1476.259	1
S122	59.644	132.225	1
S123_1	668.642	22309.393	1
S126	304.22	1500.539	1
S128_1	362.657	3683.22	1
S128_3	88.73	333.025	1
S128_4	131.285	280.734	1
S13	895.981	38534.838	1
S130	622.887	6453.473	1
S135	370.13	3603.291	1
S135_2	315.527	2135.183	1
S135_4	194.92	883.385	1
S138	345.481	2904.866	1
S14	796.88	33566.433	1
S141	100.226	495.075	1
S2	1627.441	106358.672	1

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Table 6E: ARM Subcatchments (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S2_1	157.843	1534.804	1
S2_3	1284.924	43708.974	1
S23	289.85	2122.072	1
S25	572.013	8217.123	1
S26	226.137	2209.877	1
S26_1	210.057	1536.428	1
S26_2	644.649	9327.342	1
S28	336.748	3040.206	1
S30	617.351	17821.744	1
S32	756.561	8203.518	1
S33	1019.231	35810.985	1
S36	1284.844	49364.997	1
S46_2	317.357	1711.653	1
S49_1	824.311	12680.818	1
S49_2	327.795	4577.905	1
S49_3	134.11	1118.726	1
S49_4	636.595	9031.481	1
S49_5	88.964	331.036	1
S49_6	195.824	1823.61	1
S49_8	121.828	726.955	1
S5	548.842	4387.004	1
S52_2	208.657	1007.1	1
S53	693.413	12557.385	1
S6	201.685	1127.756	1
S6_1	349.322	5010.388	1
S6_3	667.94	19372.264	1

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Table 6E: ARM Subcatchments (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S6_4	354.418	6315.075	1
S7	129.15	502.961	1
S70_2	717.708	11615.95	1
S75_2	1002.106	6583.03	1
S76_1	859.132	21455.902	1
S8	242.966	1506.778	1
S80_1	242.097	2340.437	1
S9	211.337	1535.98	1
S90_1	153.485	557.903	1
S90_2	338.375	1784.976	1
S97_2	294.868	1210.755	1
S99_2	267.109	928.72	1
R1_1	234.206	1969.851	1
R3_1	147.113	1245.434	1
R3_3	49.68	159.372	1
R3_4	353.112	3185.744	1
S98_3	178.953	814.244	1
R4_1	785.818	8199.973	1
R4_2	257.642	1939.276	1
R5	347.858	6416.274	1

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PCSWMM Report

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Existing

Model ShankPainter_EX_10yr24hr_2024.03.21.inp

Apex Companies, LLC

March 30, 2024

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Summary 1: Options

Name	ShankPainter_EX_10yr24hr_2024.03.21
Flow Units	CFS
Infiltration method	Curve Number
Flow routing method	Dynamic Wave
Link offsets defined by	Depth
Allow ponding	No
Skip steady flow periods	No
Inertial dampening	Full
Define supercritical flow by	Both
Force Main Equation	H-W
Variable time step	On
Adjustment factor (%)	75
Conduit lengthening (s)	0
Minimum surface area (ft²)	0.1
Starting date	Oct-31-2018 12:00:00 AM
Ending date	Nov-2-2018 12:00:00 AM
Duration of simulation (hours)	48
Antecedent dry days (days)	0
Rain interval (h:mm)	0:06
Report time step (h:mm:ss)	00:01:00
Wet time step (h:mm:ss)	00:05:00
Dry time step (h:mm:ss)	00:05:00
Routing time step (s)	0.5
Minimum time step used (s)	0.1
Average time step used (s)	0.5
Minimum conduit slope	0
Ignore rainfall/runoff	No
Ignore snow melt	No
Ignore groundwater	No
Ignore flow routing	No
Ignore water quality	No
Report average results	No

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Summary 2: Model inventory

Name	ShankPainter_EX_10yr24hr_2024.03.21
Raingages	3
Subcatchments	0
Aquifers	0
Snowpacks	0
RDII hydrographs	0
Junction nodes	1946
Outfall nodes	349
Flow divider nodes	0
Storage unit nodes	12
Conduit links	5466
Pump links	0
Orifice links	40
Weir links	0
Outlet links	0
Treatment units	0
Transects	1
Control rules	0
Pollutants	0
Land Uses	0
Control Curves	0
Diversion Curves	0
Pump Curves	0
Rating Curves	0
Shape Curves	0
Storage Curves	12
Tidal Curves	0
Weir Curves	0
Time Series	4
Time Patterns	0

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Summary 3: Model complexity

Name	ShankPainter_EX_10yr24hr_2024.03.21
Subcatchments	n/a
Groundwater	n/a
Aquifers	n/a
Snowpacks	n/a
RDII hydrographs	n/a
Junction nodes	3963
Outfall nodes	349
Flow divider nodes	n/a
Storage unit nodes	36
Conduit links	32691
Pump links	n/a
Orifice links	160
Weir links	n/a
Outlet links	n/a
Transect	3
Pollutants	n/a
Land Uses	n/a
Model complexity (total uncertain input parameters)	37202

Summary 4: Node statistics

Name	ShankPainter_EX_10yr24hr_2024.03.21
Max. ground elev. (ft)	81.527
Min. ground elev. (ft)	4.5
Max. invert elev. (ft)	52.558
Min. invert elev. (ft)	1.5
Max. depth (ft)	30
Min. depth (ft)	0

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Summary 5: Conduit statistics

Name	ShankPainter_EX_10yr24hr_2024.03.21
Max. roughness	0.4
Min. roughness	0.01
Max. entry loss coef.	0.5
Min. entry loss coef.	0
Max. exit loss coef.	0
Min. exit loss coef.	0
Max. avg. loss coef.	0.5
Min. avg. loss coef.	0
Max. length (ft)	525.428
Min. length (ft)	5.84
Total length (ft)	129787.795
Max. slope (ft/ft)	2.0301
Min. slope (ft/ft)	-0.6074

Summary 6: Conduit Inventory

Name	ShankPainter_EX_10yr24hr_2024.03.21
Open Rectangular (ft)	122599.077
Circular (ft)	7188.718

Summary 7: Pipe inventory

Name	ShankPainter_EX_10yr24hr_2024.03.21
Max. pipe diameter (ft)	1.5
Min. pipe diameter (ft)	0.833
Total 12” pipe length (ft)	6004.031
Total 15” pipe length (ft)	304.631
Total 18” pipe length (ft)	668.046
Total other pipe length (ft)	212.01
Total pipe length (ft)	7188.718

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Summary 8: Flow routing continuity

Name	ShankPainter_EX_10yr24hr_2024.03.21
Dry weather inflow (MG)	0.000
Wet weather inflow (MG)	0.000
Groundwater inflow (MG)	0.000
RDII inflow (MG)	0.000
External inflow (MG)	7.752
External outflow (MG)	2.919
Flooding loss (MG)	2.104
Evaporation loss (MG)	0.000
Exfiltration loss (MG)	0.000
Initial stored volume (MG)	0.002
Final stored volume (MG)	2.731
Continuity error (%)	0.003

Summary 9: Results statistics

Name	ShankPainter_EX_10yr24hr_2024.03.21
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	18.61
Num. nodes surcharged	10
Max. node surcharge duration (hours)	0.93
Max. node height above crown (ft)	17.615
Min. node depth below rim (ft)	-1.07
Num. nodes flooded	3
Max. node flooding duration (hours)	36.52
Max. node flood volume (MG)	1.011
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	168.456
Max. storage percent full (%)	100
Max. outfall flow frequency (%)	81.21
Max. outfall peak flow (cfs)	25.17
Max. outfall total volume (MG)	1.696
Total outfall volume (MG)	7.929
Max. link peak flow (cfs)	20.48
Max. link peak velocity (ft/s)	14.55
Min. link peak velocity (ft/s)	0

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Summary 9: Results statistics (continued...)

Name	ShankPainter_EX_10yr24hr_2024.03.21
Num. conduits surcharged	49
Max. conduit surcharge duration (hours)	45.24
Max. conduit capacity limited duration (hours)	2.03

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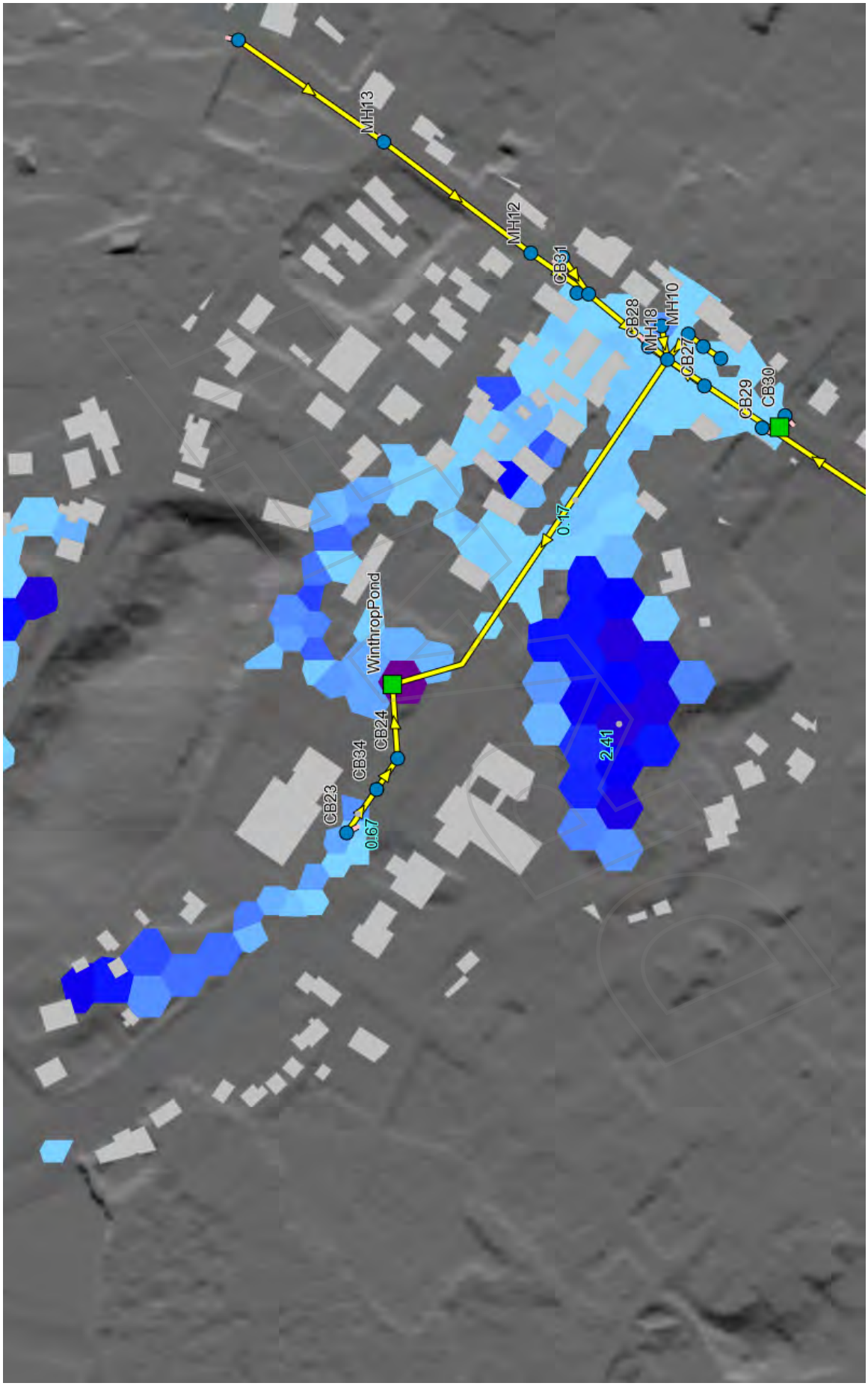


Figure 1: South Shank Painter

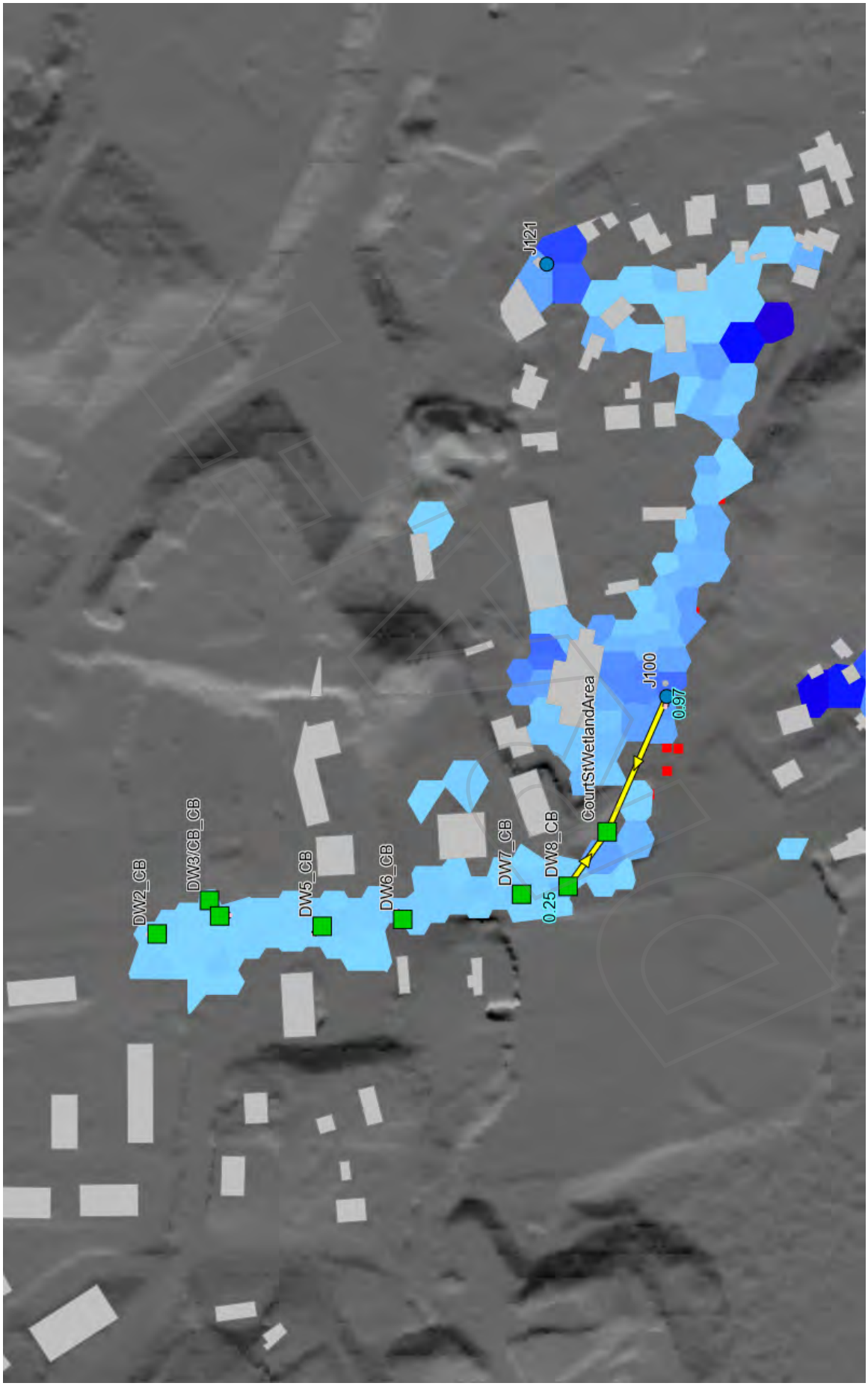


Figure 2: Court Street

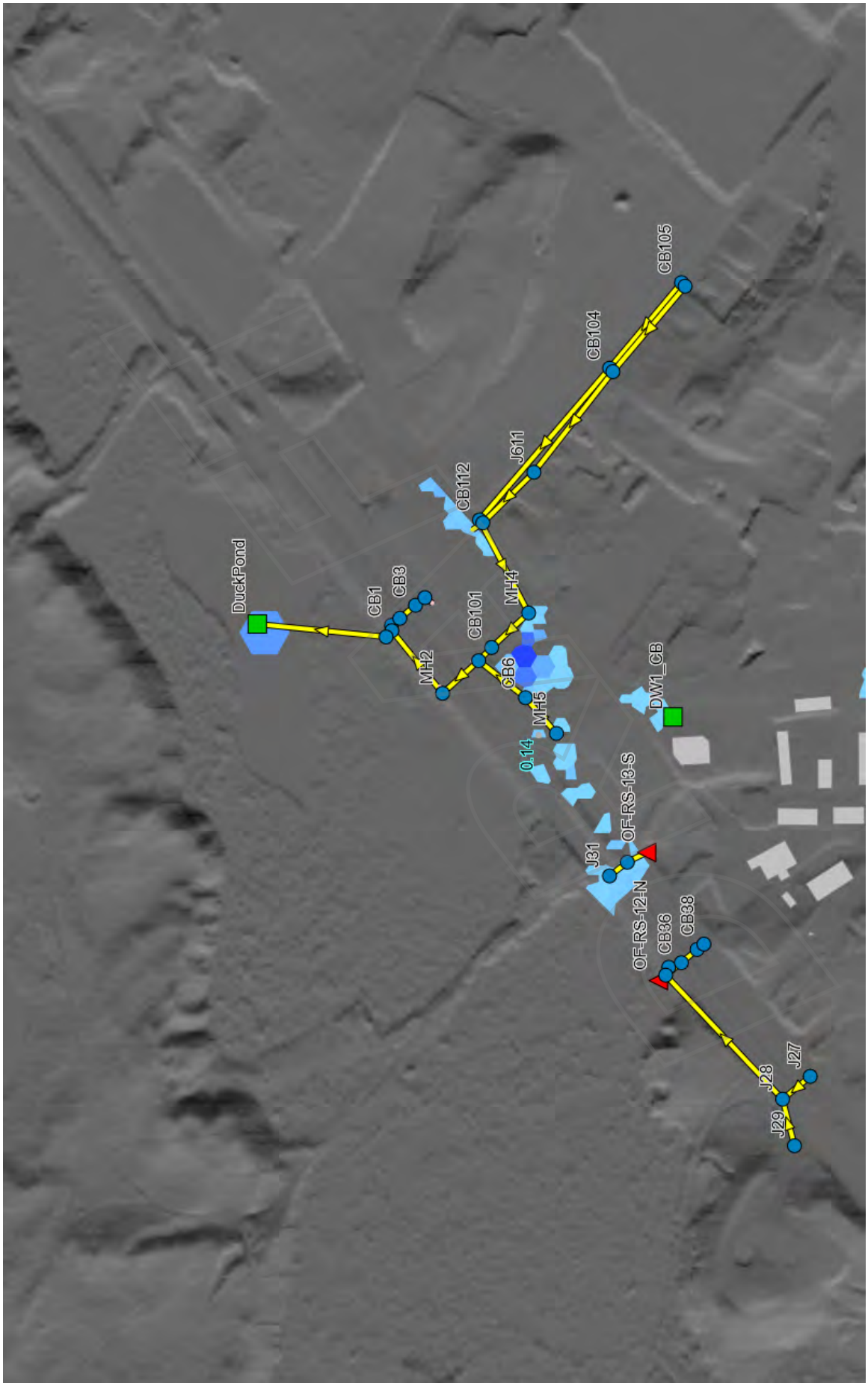


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

Table 1A: Storages

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Evap. Factor (fraction)
CourtStWetlandArea	1010557.027	2846257.418	Zone4	NO	NO	3	6	3	0	0	0	0
DuckPond	1010546.204	2848276.651	DirectConnection	NO	NO	4	5	1	0	0	0	0
DW#9	1011400.39	2845161.145		NO	NO	8.15	15.65	7.5	0	0	0	0
DW1	1010327.064	2847296.604		NO	NO	13.7	23.25	9.55	0	0	0	0
DW2	1010428.943	2846822.099		NO	NO	15.18	23.18	8	0	0	0	0
DW3/CB	1010470.911	2846756.334		NO	NO	14.05	21.85	7.8	0	0	0	0
DW4/CB	1010451.455	2846743.609		NO	NO	14.66	21.16	6.5	0	0	0	0
DW5	1010438.474	2846614.939		NO	NO	11.35	19.35	8	0	0	0	0
DW6	1010447.126	2846514.015		NO	NO	9.72	17.61	7.89	0	0	0	0
DW7	1010478.707	2846364.865		NO	NO	7.79	15.68	7.89	0	0	0	0
DW8	1010488.609	2846306.387		NO	NO	6.56	14.06	7.5	0	0	0	0
WinthropPond	1011093.123	2845623.4	Zone6	NO	NO	1.5	4.5	3	0	0	0	0

Table 1B: Storages

Name	Storage Curve	Coefficient	Exponent	Constant (ft²)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series	Scale Factor
CourtStWetlandArea	TABULAR	1000	0	0	CourtStWetlandArea	0	0	0	0	0			1
DuckPond	TABULAR	1000	0	0	DuckPond5ft	0	0	0	0	0			1
DW#9	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW1	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW2	TABULAR	1000	0	0	Drywell_#2	0	0	0	0	0			1
DW3/CB	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW4/CB	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW5	TABULAR	1000	0	0	Drywell_#5	0	0	0	0	0			1

Table 1B: Storages (continued...)

Name	Storage Curve	Coefficient	Exponent	Constant (ft^2)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series	Scale Factor
DW6	TABULAR	1000	0	0	Drywell_#6	0	0	0	0	0			1
DW7	TABULAR	1000	0	0	Drywell_#7	0	0	0	0	0			1
DW8	TABULAR	1000	0	0	Drywell_#8	0	0	0	0	0			1
WinthropPond	TABULAR	1000	0	0	WinthropPond	0	0	0	0	0			1

Table 1C: Storages

Name	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (fraction)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
CourtStWetlandArea	0						0	0	0	0	1.81	3	6
DuckPond	0						0	0	0	0	0.42	0.59	4.59
DW#9	0						0	0	0	0	6.14	7.04	15.19
DW1	0						0	0	0	0	7.18	9.33	23.03
DW2	0						0	0	0	0	5.33	7.42	22.6
DW3/CB	0						0	0	0	0	5.12	6.9	20.95
DW4/CB	0						0	0	0	0	5.15	6.15	20.81
DW5	0						0	0	0	0	2.96	4.1	15.45
DW6	0						0	0	0	0	5.8	7.61	17.33
DW7	0						0	0	0	0	5.45	7.12	14.91
DW8	0						0	0	0	0	5.13	6.72	13.28
WinthropPond	0						0	0	0	0	2.35	3	4.5

Table 1D: Storages

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
CourtStWetlandArea	10/31/2018 12:02 PM	3	0.23	13.96	0.008	0.475	0.028	0	0	2.06	0.84	11.3	0.114
DuckPond	11/01/2018 02:58 AM	0.59	11.79	19.63	0.522	1.26	0.003	0	0	0.91	0	0	0
DW#9	10/31/2018 12:05 PM	7.04	0	0.9	0	0.03	1.855	0	0	0.46	0	0	0
DW1	10/31/2018 12:54 PM	9.33	0	0.13	0	0.003	8.472	0	0	0.22	0	0	0
DW2	11/01/2018 01:02 AM	7.42	0	0.3	0	0.013	1.619	0	0	0.58	0	0	0
DW3/CB	11/01/2018 01:15 AM	6.9	0	0.06	0	0.003	8.612	0	0	0.9	0	0	0
DW4/CB	10/31/2018 12:09 PM	6.15	0	0.03	0	0.002	9.75	0	0	0.35	0	0	0
DW5	11/01/2018 23:59 PM	4.1	0	0.24	0	0.008	1.7	0	0	3.9	0	0	0
DW6	10/31/2018 12:12 PM	7.61	0	1.04	0	0.014	1.587	0	0	0.28	0	0	0
DW7	10/31/2018 12:10 PM	7.12	0	0.9	0	0.012	1.807	0	0	0.77	0	0	0
DW8	10/31/2018 12:08 PM	6.72	0	0.13	0	0.005	3.784	0	0	0.78	0	0	0
WinthropPond	10/31/2018 11:55 AM	3	4.85	24.44	0.134	1.3	0.529	0	0	0	36.07	24.44	1.011

Table 1E: Storages

Name	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
CourtStWetlandArea	0	7.154	55	0	0	0	12.972	100	2.66	0	0	0
DuckPond	0	115.547	31	0	0	0	168.456	46	0	0	0	0
DW#9	0	0.244	81	0	0	0	0.282	93	0.91	0	0	0
DW1	0	0.29	75	0	0	0	0.379	98	0	0	0	0
DW2	0	1.224	66	0	0	0	1.715	93	0	0	0	0
DW3/CB	0	0.202	64	0	0	0	0.276	88	0	0	0	0
DW4/CB	0	0.203	78	0	0	0	0.244	94	0	0	0	0
DW5	0	0.769	35	0	0	0	1.073	49	0	0	0	0

Table 1E: Storages (continued...)

Name	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
DW6	0	1.373	73	0	0	0	1.809	96	0.01	0	0	0
DW7	0	1.148	68	0	0	0	1.505	90	0.01	0	0	0
DW8	0	0.505	68	0	0	0	0.666	89	0.01	0	0	0
WinthropPond	0	29.746	78	0	0	0	38	100	0	0	0	0

Table 1F: Storages

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CourtStWetlandArea	0	0	1
DuckPond	0	0	1
DW#9	0	0	1
DW1	0	0	1
DW2	0	0	1
DW3/CB	0	0	1
DW4/CB	0	0	1
DW5	0	0	1
DW6	0	0	1
DW7	0	0	1
DW8	0	0	1
WinthropPond	0	0	1

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Table 2A: Junctions

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
CB1	1010543.4	2847960.354	Connect2D_orifices	NO	NO	5.58	11.33	5.75	0	30	0	0	
CB101	1010490.895	2847724.25	Connect2D	NO	NO	6.58	12.18	5.6	0	30	0	0	
CB104	1011149.472	2847446.085		NO	NO	11.53	15.969	4.439	0	50	0	0	
CB105	1011351.247	2847276.782		NO	NO	17.62	19.674	2.054	0	50	0	0	
CB112	1010791.703	2847752.789		NO	NO	8.98	12.818	3.838	0	50	0	0	
CB2	1010559.723	2847940.655	Connect2D_orifices	NO	NO	6.08	11.13	5.05	0	30	0	0	
CB23	1010916.007	2845678.085	Connect2D_orifices	NO	NO	3.84	6.04	2.2	0	30	0	0	
CB24	1011004.87	2845617.259	Connect2D_orifices	NO	NO	3.09	5.99	2.9	0	30	0	0	
CB27	1011449.616	2845250.949	Connect2D_orifices	NO	NO	8	10.039	2.039	0	30	0	0	
CB28	1011496.541	2845317.631	Connect2D_orifices	NO	NO	5.5	9.25	3.75	0	30	0	0	
CB29	1011399.511	2845181.95	Connect2D_orifices	NO	NO	11.88	14.18	2.3	0	30	0	0	
CB3	1010590.535	2847903.6	Connect2D_orifices	NO	NO	6.13	11.23	5.1	0	30	0	0	
CB30	1011414.192	2845154.644	Connect2D_orifices	NO	NO	12.37	15.17	2.8	0	30	0	0	
CB31	1011560.681	2845403.096	Connect2D_orifices	NO	NO	8.85	11.7	2.85	0	30	0	0	
CB32	1011603.491	2845420.161	Connect2D_orifices	NO	NO	8.21	10.91	2.7	0	30	0	0	
CB33	1011521.313	2845302.115	Connect2D_orifices	NO	NO	5.55	9.05	3.5	0	30	0	0	
CB34	1010967.796	2845642.325	Connect2D_orifices	NO	NO	3.16	6.06	2.9	0	30	0	0	
CB35	1009736.842	2847306.934		NO	NO	6.76	12.09	5.33	0	30	0	0	
CB36	1009747.672	2847276.924		NO	NO	6.99	12.09	5.1	0	30	0	0	
CB37	1009778.85	2847240.103		NO	NO	7.23	12.04	4.81	0	30	0	0	
CB38	1009791.611	2847223.915		NO	NO	7.85	12.04	4.19	0	30	0	0	
CB4	1010608.483	2847881.463	Connect2D_orifices	NO	NO	6.36	11.16	4.8	0	30	0	0	
CB6	1010372.626	2847644.457	Connect2D_orifices	NO	NO	7.08	11.13	4.05	0	30	0	0	
DW1_CB	1010326.268	2847296.606	Connect2D_orifices	NO	NO	15.7	23.017	7.317	0	30	0	0	
DW2_CB	1010428.791	2846823.007	Connect2D_orifices	NO	NO	17.18	22.856	5.676	0	30	0	0	
DW3/CB_CB	1010471.232	2846756.294	Connect2D_orifices	NO	NO	16.05	21.742	5.692	0	30	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
DW4/CB_CB	1010450.889	2846743.592	Connect2D_orifices	NO	NO	16.66	20.744	4.084	0	30	0	0	
DW5_CB	1010438.501	2846615.469	Connect2D_orifices	NO	NO	13.35	18.726	5.376	0	30	0	0	
DW6_CB	1010446.739	2846514.06	Connect2D_orifices	NO	NO	11.72	17.223	5.503	0	30	0	0	
DW7_CB	1010478.491	2846364.887	Connect2D_orifices	NO	NO	9.79	14.78	4.99	0	30	0	0	
DW8_CB	1010488.932	2846306.194	Connect2D_orifices	NO	NO	8.56	13.472	4.912	0	30	0	0	
J1	1006841.74	2845465.493		NO	NO	27.4	32.9	5.5	0	50	0	0	
J10	1008672.424	2846345.08		NO	NO	31	36.6	5.6	0	50	0	0	
J100	1010726.938	2846182.757		NO	NO	3.31	5.26	1.95	0	0	0	0	
J1048	1010488.392	2846314.248	2D_label	NO	NO	13.649	43.649	30	0	0	0	0	
J11	1005923.53	2844777.21		NO	NO	21	26.115	5.115	0	50	0	0	
J1134	1010743.392	2846184.348	2D_label	NO	NO	5.012	35.012	30	0	0	0	0	
J12	1005617.671	2844526.538		NO	NO	16.5	21.2	4.7	0	50	0	0	
J121	1011269.487	2846333.216	DirectConnection	NO	NO	7.185	7.185	0	0	30	0	0	
J13	1005898.8	2844802.636		NO	NO	20.7	25.178	4.478	0	50	0	0	
J1391	1010938.392	2845664.748	2D_label	NO	NO	5.561	35.561	30	0	0	0	0	
J14	1007660.717	2845841.779		NO	NO	33	38.2	5.2	0	50	0	0	
J15	1007693.105	2845773.999		NO	NO	33.2	38.2	5	0	50	0	0	
J1563	1011313.392	2845404.948	2D_label	NO	NO	7.865	37.865	30	0	0	0	0	
J16	1008017.631	2846022.698		NO	NO	35	40.6	5.6	0	50	0	0	
J17	1008052.712	2845956.117		NO	NO	35.6	40.617	5.017	0	50	0	0	
J18	1005326.069	2844318.463		NO	NO	13.74	17.97	4.23	0	50	0	0	
J2	1009033.294	2846722.781		NO	NO	21.4	27.8	6.4	0	30	0	0	
J20	1005571.622	2844576.409		NO	NO	16	21.2	5.2	0	50	0	0	
J22	1005435.367	2844345.713		NO	NO	14.5	19	4.5	0	50	0	0	
J23	1005396.081	2844465.056		NO	NO	8	13.349	5.349	0	50	0	0	
J25	1007203.876	2845643.62		NO	NO	30.5	35.3	4.8	0	50	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
J26	1007233.433	2845579.973		NO	NO	30.1	35.3	5.2	0	50	0	0	
J27	1009479.713	2846973.226		NO	NO	14.15	19.01	4.86	0	30	0	0	
J28	1009425.906	2847038.355		NO	NO	13.18	18.8	5.62	0	30	0	0	
J29	1009316.153	2847010.384		NO	NO	13.55	21.71	8.16	0	50	0	0	
J3	1006870.603	2845395.681		NO	NO	27.7	32.743	5.043	0	50	0	0	
J30	1009984.72	2847404.505	Connect2D_orifices	NO	NO	4.8	9.3	4.5	0	30	0	0	
J31	1009952.378	2847446.349	Connect2D_orifices	NO	NO	5.1	9.4	4.3	0	30	0	0	
J32	1009718.364	2847313.955		NO	NO	5.5	9.8	4.3	0	50	0	0	
J4	1006494.893	2845267.078		NO	NO	25.7	30.676	4.976	0	50	0	0	
J417	1011045.896	2845352.789	2D_label	NO	NO	2.588	32.588	30	0	0	0	0	
J445	1011141.216	2847438.472		NO	NO	15.852	15.852	0	0	0	0	0	
J5	1006199.682	2845072.656		NO	NO	23.5	28.576	5.076	0	50	0	0	
J564	1010784.775	2847744.961		NO	NO	12.788	12.788	0	0	0	0	0	
J6	1009085.26	2846666.103		NO	NO	22	27.428	5.428	0	30	0	0	
J611	1010904.043	2847624.504		NO	NO	13.624	13.624	0	0	0	0	0	
J66	1011342.74	2847268.156		NO	NO	19.557	19.557	0	0	0	0	0	
J7	1006533.642	2845207.831		NO	NO	24	30.512	6.512	0	50	0	0	
J739	1010284.392	2847613.248	2D_label	NO	NO	11.057	41.057	30	0	0	0	0	
J8	1006239.797	2845014.495		NO	NO	22.8	28.379	5.579	0	50	0	0	
J9	1008626.945	2846408.03		NO	NO	32	36.8	4.8	0	50	0	0	
MH1	1010530.644	2847959.58	Connect2D_MH	NO	NO	4.73	10.954	6.224	0	30	0	0	
MH10	1011511.543	2845270.131		NO	NO	8.24	10.04	1.8	0	50	0	0	
MH11	1011559.458	2845389.196		NO	NO	8	11.188	3.188	0	50	0	0	
MH12	1011608.36	2845458.27	Connect2D_orifices	NO	NO	12	15.157	3.157	0	30	0	0	
MH13	1011741.006	2845633.705	Connect2D_orifices	NO	NO	24	28.74	4.74	0	30	0	0	
MH14	1011862.65	2845807.307	Connect2D_orifices	NO	NO	31	35.203	4.203	0	30	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
MH15	1011240.734	2844935.933	Connect2D_orifices	NO	NO	25	30.512	5.512	0	30	0	0	
MH16	1011171.126	2844842.863	Connect2D_orifices	NO	NO	25.5	30.676	5.176	0	30	0	0	
MH17	1011090.371	2844735.468	Connect2D_orifices	NO	NO	28.44	32.448	4.008	0	30	0	0	
MH18	1011481.215	2845295.06		NO	NO	5.62	8.957	3.337	0	50	0	0	
MH2	1010382.993	2847839.795	Connect2D	NO	NO	5.58	11.867	6.287	0	30	0	0	
MH3	1010459.751	2847754.847	Connect2D	NO	NO	6.08	12.069	5.989	0	30	0	0	
MH4	1010572.351	2847637.139	Connect2D	NO	NO	7.83	12.009	4.179	0	30	0	0	
MH5	1010288.201	2847571.427	Connect2D_orifices	NO	NO	7.45	11.5	4.05	0	30	0	0	
MH8	1011482.438	2845231.488		NO	NO	8.21	10.51	2.3	0	50	0	0	
MH9	1011496.673	2845252.412		NO	NO	8.1	10.1	2	0	50	0	0	
OF-SP-1-WJ	1010515.721	2847973.034	Zone2	NO	NO	4.67	4.67	0	0	0	0	0	

Table 2B: Junctions

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
CB1		1	0						0	0.04	1.56	7.14	10/31/2018 12:05 PM	1.56
CB101		1	0						0	0.2	4.27	10.85	10/31/2018 12:06 PM	4.27
CB104		1	0						0	0.27	4.77	16.3	10/31/2018 12:11 PM	4.77
CB105		1	0						0	0.11	2.45	20.07	10/31/2018 12:20 PM	2.45
CB112		1	0						0	0.24	4.16	13.14	10/31/2018 12:16 PM	4.16
CB2		1	0						0	0.04	1.29	7.37	10/31/2018 12:05 PM	1.29
CB23		1	0						0	0.52	1.81	5.65	10/31/2018 12:05 PM	1.81
CB24		1	0						0	1.08	2.03	5.12	10/31/2018 12:05 PM	2.02
CB27		1	0						0	0.02	0.84	8.84	10/31/2018 12:05 PM	0.83

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
CB28		1	0						0	0.26	3.33	8.83	10/31/2018 12:05 PM	3.33
CB29		1	0						0	2.66	3.28	15.16	10/31/2018 12:05 PM	3.28
CB3		1	0						0	0.03	1.25	7.38	10/31/2018 12:05 PM	1.24
CB30		1	0						0	2.22	2.84	15.21	10/31/2018 12:05 PM	2.84
CB31		1	0						0	0.02	2.96	11.81	10/31/2018 12:05 PM	2.96
CB32		1	0						0	0.06	3.77	11.98	10/31/2018 12:05 PM	3.77
CB33		1	0						0	0.3	4.32	9.87	10/31/2018 12:05 PM	4.32
CB34		1	0						0	1.04	2.3	5.46	10/31/2018 12:05 PM	2.29
CB35		1	0						0	0	1.4	8.16	10/31/2018 12:05 PM	1.38
CB36		1	0						0	0.03	1.47	8.46	10/31/2018 12:05 PM	1.43
CB37		1	0						0	0.04	1.39	8.62	10/31/2018 12:05 PM	1.36
CB38		1	0						0	0.03	0.86	8.71	10/31/2018 12:05 PM	0.83
CB4		1	0						0	0.01	1.02	7.38	10/31/2018 12:05 PM	1.01
CB6		1	0						0	0.12	4.29	11.37	10/31/2018 12:05 PM	4.29
DW1_CB		1	0						0	5.51	7.33	23.03	10/31/2018 12:53 PM	7.33
DW2_CB		1	0						0	3.77	5.43	22.61	11/01/2018 01:03 AM	5.43
DW3/CB_CB		1	0						0	3.46	4.9	20.95	11/01/2018 00:53 AM	4.9
DW4/CB_CB		1	0						0	3.34	4.15	20.81	10/31/2018 12:09 PM	4.15
DW5_CB		1	0						0	1.43	2.1	15.45	11/01/2018 22:39 PM	2.1
DW6_CB		1	0						0	4.17	5.61	17.33	10/31/2018 12:12 PM	5.61
DW7_CB		1	0						0	3.81	5.12	14.91	10/31/2018 12:09 PM	5.12
DW8_CB		1	0						0	3.46	4.72	13.28	10/31/2018 12:08 PM	4.72
J1		1	0						0	0.03	0.38	27.78	10/31/2018 12:05 PM	0.38
J10		1	0						0	0.02	0.2	31.2	10/31/2018 12:05 PM	0.2
J100		1	0						0	1.51	1.95	5.26	10/31/2018 11:29 AM	1.95
J1048		1	0						0	0.02	0.25	13.9	10/31/2018 12:07 PM	0.25

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
J11		1	0						0	0.04	0.66	21.66	10/31/2018 12:05 PM	0.66
J1134		1	0						0	0.34	0.97	5.98	10/31/2018 12:15 PM	0.97
J12		1	0						0	0.05	0.63	17.13	10/31/2018 12:05 PM	0.63
J121		1	0						0	0.45	0.71	7.89	10/31/2018 12:05 PM	0.71
J13		1	0						0	0.05	0.7	21.4	10/31/2018 12:05 PM	0.7
J1391		1	0						0	0.44	0.67	6.23	10/31/2018 13:30 PM	0.67
J14		1	0						0	0.02	0.24	33.24	10/31/2018 12:05 PM	0.24
J15		1	0						0	0.05	0.48	33.68	10/31/2018 12:05 PM	0.48
J1563		1	0						0	0.01	0.17	8.03	10/31/2018 12:06 PM	0.16
J16		1	0						0	0.02	0.19	35.19	10/31/2018 12:05 PM	0.19
J17		1	0						0	0.02	0.28	35.88	10/31/2018 12:05 PM	0.28
J18		1	0						0	0.02	0.31	14.05	10/31/2018 12:05 PM	0.31
J2		1	0						0	0.03	0.39	21.79	10/31/2018 12:10 PM	0.39
J20		1	0						0	0.04	0.5	16.5	10/31/2018 12:05 PM	0.5
J22		1	0						0	0.02	0.23	14.73	10/31/2018 12:05 PM	0.23
J23		1	0						0	0.05	0.67	8.67	10/31/2018 12:05 PM	0.66
J25		1	0						0	0.03	0.49	30.99	10/31/2018 12:05 PM	0.49
J26		1	0						0	0.04	0.46	30.56	10/31/2018 12:20 PM	0.46
J27		1	0						0	0.08	17.36	31.51	10/31/2018 12:02 PM	12.02
J28		1	0						0	0.1	17.03	30.21	10/31/2018 12:02 PM	12.29
J29		1	0						0	0.1	18.61	32.16	10/31/2018 12:02 PM	13.29
J3		1	0						0	0.03	0.43	28.13	10/31/2018 12:05 PM	0.43
J30		1	0						0	0.18	4.61	9.41	10/31/2018 12:05 PM	4.61
J31		1	0						0	0.19	4.9	10	10/31/2018 12:05 PM	4.9
J32		1	0						0	0.07	2.65	8.15	10/31/2018 12:05 PM	2.64
J4		1	0						0	0.02	0.31	26.01	10/31/2018 12:05 PM	0.31

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
J417		1	0						0	1.75	2.41	5	11/01/2018 23:59 PM	2.41
J445		1	0						0	0	0.15	16.01	10/31/2018 12:20 PM	0.15
J5		1	0						0	0.02	0.2	23.7	10/31/2018 12:15 PM	0.2
J564		1	0						0	0.01	0.24	13.03	10/31/2018 12:16 PM	0.24
J6		1	0						0	0.05	0.66	22.66	10/31/2018 12:10 PM	0.66
J611		1	0						0	0.01	0.26	13.89	10/31/2018 12:16 PM	0.26
J66		1	0						0	0	0.1	19.65	10/31/2018 12:20 PM	0.1
J7		1	0						0	0.02	0.25	24.25	10/31/2018 12:05 PM	0.25
J739		1	0						0	0.1	0.14	11.19	10/31/2018 17:45 PM	0.14
J8		1	0						0	0.02	0.29	23.09	10/31/2018 12:10 PM	0.29
J9		1	0						0	0	0	32	10/31/2018 00:00 AM	0
MH1		1	0						0	0.2	2.36	7.09	10/31/2018 12:05 PM	2.34
MH10		1	0						0	0	0.59	8.83	10/31/2018 12:05 PM	0.59
MH11		1	0						0	0.08	3.86	11.86	10/31/2018 12:05 PM	3.83
MH12		1	0						0	0.05	1.43	13.43	10/31/2018 12:05 PM	1.43
MH13		1	0						0	0.03	0.37	24.37	10/31/2018 12:05 PM	0.37
MH14		1	0						0	0.02	0.24	31.24	10/31/2018 12:05 PM	0.24
MH15		1	0						0	0.04	0.4	25.4	10/31/2018 12:05 PM	0.39
MH16		1	0						0	0.06	0.7	26.2	10/31/2018 12:05 PM	0.7
MH17		1	0						0	0.02	0.21	28.65	10/31/2018 12:05 PM	0.21
MH18		1	0						0	0.15	3.22	8.84	10/31/2018 12:05 PM	3.21
MH2		1	0						0	0.2	3.48	9.06	10/31/2018 12:05 PM	3.48
MH3		1	0						0	0.22	4.18	10.26	10/31/2018 12:06 PM	4.18
MH4		1	0						0	0.22	4.42	12.25	10/31/2018 12:10 PM	4.42
MH5		1	0						0	0.08	4.03	11.48	10/31/2018 12:05 PM	4.03
MH8		1	0						0	0.02	0.63	8.84	10/31/2018 12:05 PM	0.62

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
MH9		1	0						0	0.11	0.74	8.84	10/31/2018 12:05 PM	0.73
OF-SP-1-WJ		1	0						0	0.12	1.03	5.7	10/31/2018 12:05 PM	1.03

Table 2C: Junctions

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
CB1	0	2.52	0	0.07	-0.002	0	0	4.19	0	0	0	0	0	0
CB101	0	4.06	0	0.518	0.004	0	0	1.33	0	0	0	0	0	0
CB104	3.62	7.42	0.126	0.482	-0.023	0	0	-0.331	0	0	0	0	0	0
CB105	10.4	10.4	0.44	0.44	-0.001	0	0	-0.396	0	0	0	0	0	0
CB112	0	3.13	0	0.406	-0.004	0	0	-0.322	0	0	0	0	0	0
CB2	2.55	2.55	0.07	0.071	-0.001	0	0	3.76	0	0	0	0	0	0
CB23	2.03	2.04	0.059	0.14	0.092	0	0	0.39	0	0	0	0	0	0
CB24	0.14	3.14	0.004	0.171	0.277	0	0	0.87	0	0	0	0	0	0
CB27	0.31	0.37	0.01	0.012	-0.008	0	0	1.199	0	0	0	0	0	0
CB28	0.26	0.59	0.008	0.008	0.056	0	0	0.42	0	0	0	0	0	0
CB29	3.41	4.31	0.105	0.133	0.093	0	0	-0.98	0	0	0	0	0	0
CB3	0	0.13	0	0	0.007	0	0	3.85	0	0	0	0	0	0
CB30	0.9	0.9	0.028	0.028	0.279	0	0	-0.04	0	0	0	0	0	0
CB31	0	0.95	0	0.002	0.004	0	0	-0.11	0	0	0	0	0	0
CB32	1.57	1.57	0.044	0.044	0.002	0	0	-1.07	0	0	0	0	0	0
CB33	19.33	19.33	0.563	0.568	0.003	0	0	-0.82	0	0	0	0	0	0
CB34	0.99	3.01	0.028	0.167	0.237	0	0	0.6	0	0	0	0	0	0
CB35	0	0.4	0	0	-2.434	0.07	0.396	3.934	0	0	0	0	0	0

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
CB36	0.65	2.34	0.019	0.074	-0.006	0.08	0.468	3.632	0	0	0	0	0	0
CB37	0.03	1.7	0.003	0.054	-0.005	0.06	0.386	3.424	0	0	0	0	0	0
CB38	1.69	1.69	0.051	0.051	0	0	0	3.33	0	0	0	0	0	0
CB4	0	0.04	0	0	0.054	0	0	3.78	0	0	0	0	0	0
CB6	4.95	5.91	0.139	0.166	-0.003	0	0	-0.24	0	0	0	0	0	0
DW1_CB	0	0.14	0	0.003	5.76	0	0	-0.013	0	0	0	0	0	0
DW2_CB	0	0.3	0	0.014	1.081	0	0	0.246	0	0	0	0	0	0
DW3/CB_CB	0	0.06	0	0.003	5.277	0	0	0.792	0	0	0	0	0	0
DW4/CB_CB	0	0.03	0	0.002	5.458	0	0	-0.066	0	0	0	0	0	0
DW5_CB	0	0.24	0	0.009	0.821	0	0	3.276	0	0	0	0	0	0
DW6_CB	0	1.05	0	0.014	1.051	0	0	-0.107	0	0	0	0	0	0
DW7_CB	0	0.88	0	0.012	1.161	0	0	-0.13	0	0	0	0	0	0
DW8_CB	0	1.09	0	0.043	0.287	0	0	0.69	0	0	0	0	0	0
J1	0.8	1.55	0.024	0.044	0.004	0	0	5.12	0	0	0	0	0	0
J10	0.95	0.95	0.026	0.026	0	0	0	5.4	0	0	0	0	0	0
J100	0	15.06	0	1.01	0.081	0	0	0.117	36.52	15.06	0.979	0	0	0
J1048	0	11.53	0	0.364	-0.001	0	0	29.749	0	0	0	0	0	0
J11	1.82	1.82	0.05	0.05	0	0	0	4.455	0	0	0	0	0	0
J1134	20.57	20.57	0.648	0.695	0	0	0	29.032	0	0	0	0	0	0
J12	1.97	1.97	0.057	0.057	0	0	0	4.07	0	0	0	0	0	0
J121	7.48	7.48	0.205	0.205	0.728	0	0	-0.705	0	0	0	0	0	0
J13	2.33	4.15	0.064	0.114	0	0	0	3.778	0	0	0	0	0	0
J1391	0	1.34	0	0.004	0	0	0	29.331	0	0	0	0	0	0
J14	0	0.9	0	0.027	0	0	0	4.96	0	0	0	0	0	0
J15	0.9	0.9	0.027	0.027	0	0	0	4.52	0	0	0	0	0	0
J1563	0	10.63	0	0.159	0	0	0	29.835	0	0	0	0	0	0

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
J16	0	0.47	0	0.014	0.001	0	0	5.41	0	0	0	0	0	0
J17	0.48	0.48	0.014	0.014	-0.001	0	0	4.737	0	0	0	0	0	0
J18	1.13	1.13	0.032	0.032	0	0	0	3.92	0	0	0	0	0	0
J2	0	2.22	0	0.079	0	0	0	6.01	0	0	0	0	0	0
J20	1.26	3.22	0.037	0.094	-0.001	0	0	4.7	0	0	0	0	0	0
J22	0.86	0.86	0.024	0.024	0.001	0	0	4.27	0	0	0	0	0	0
J23	0	4.07	0	0.118	0	0	0	4.679	0	0	0	0	0	0
J25	1.15	1.15	0.033	0.033	-0.006	0	0	4.31	0	0	0	0	0	0
J26	2.71	3.33	0.111	0.144	0.001	0	0	4.74	0	0	0	0	0	0
J27	2.75	2.75	0.103	0.103	-0.002	0.24	16.364	0	0	0	0	0	0	0
J28	0.63	6.74	0.025	0.221	-0.015	0.28	16.028	0	0	0	0	0	0	0
J29	3.41	3.41	0.094	0.094	0.007	0.33	17.615	0	0	0	0	0	0	0
J3	0.75	0.75	0.021	0.021	-0.008	0	0	4.613	0	0	0	0	0	0
J30	6.35	9.48	0.196	0.561	0	0	0	-0.11	0	0	0	0	0	0
J31	15.59	15.59	0.481	0.481	0	0	0	-0.6	0	0	0	0	0	0
J32	0	9.05	0	0.295	-0.001	0.27	1.652	1.648	0	0	0	0	0	0
J4	0.94	0.94	0.026	0.026	0.001	0	0	4.666	0	0	0	0	0	0
J417	14.77	14.77	0.471	0.477	0	0	0	27.588	0	0	0	0	0	0
J445	0	10.24	0	0.168	0.001	0	0	0.342	0	0	0	0	0	0
J5	0.3	0.3	0.018	0.018	0.028	0	0	4.876	0	0	0	0	0	0
J564	0	20.49	0	0.546	0	0	0	0.258	0	0	0	0	0	0
J6	2.22	2.22	0.079	0.079	0	0	0	4.768	0	0	0	0	0	0
J611	10.15	19.79	0.367	0.535	-0.001	0	0	0.234	0	0	0	0	0	0
J66	0	6.53	0	0.084	0.002	0	0	0.407	0	0	0	0	0	0
J7	1.03	1.97	0.028	0.054	0	0	0	6.262	0	0	0	0	0	0
J739	0	0.01	0	0	0	0	0	29.867	0	0	0	0	0	0

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
J8	2.11	2.38	0.067	0.085	-0.006	0	0	5.289	0	0	0	0	0	0
J9	0	0	0	0	0	0	0	4.8	0	0	0	0	0	0
MH1	0	8.65	0	0.738	0.039	0.93	1.108	3.866	0	0	0	0	0	0
MH10	0	0.26	0	0	-0.437	0	0	1.21	0	0	0	0	0	0
MH11	0.12	5.86	0.004	0.178	-0.006	0.34	2.856	0	0	0	0	0	0	0
MH12	2.01	4.32	0.058	0.13	-0.001	0	0	1.727	0	0	0	0	0	0
MH13	1.65	2.32	0.052	0.072	-0.003	0	0	4.37	0	0	0	0	0	0
MH14	0.68	0.68	0.019	0.019	0.008	0	0	3.963	0	0	0	0	0	0
MH15	0.44	2.32	0.013	0.073	-0.007	0	0	5.112	0	0	0	0	0	0
MH16	1.43	1.9	0.045	0.06	-0.001	0	0	4.476	0	0	0	0	0	0
MH17	0.47	0.47	0.015	0.015	-0.003	0	0	3.798	0	0	0	0	0	0
MH18	0	12.42	0	0.727	-0.024	0.52	1.721	0.116	0	0	0	0	0	0
MH2	0	6.32	0	0.668	-0.002	0	0	2.807	0	0	0	0	0	0
MH3	0	6.51	0	0.668	-0.007	0	0	1.809	0	0	0	0	0	0
MH4	4.6	6.51	0.151	0.546	0.017	0	0	-0.241	0	0	0	0	0	0
MH5	0.97	0.97	0.027	0.027	-0.007	0	0	0.02	0	0	0	0	0	0
MH8	0	0.09	0	0	2.403	0	0	1.67	0	0	0	0	0	0
MH9	0	0.18	0	0	5.51	0	0	1.26	0	0	0	0	0	0
OF-SP-1-WJ	0	8.65	0	0.738	-0.037	0	0	0.47	0	0	0	0	0	0

Table 2D: Junctions

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CB1	0	0	0	1
CB101	0	0	0	1
CB104	0	0	0	1
CB105	0	0	0	1
CB112	0	0	0	1
CB2	0	0	0	1
CB23	0	0	0	1
CB24	0	0	0	1
CB27	0	0	0	1
CB28	0	0	0	1
CB29	0	0	0	1
CB3	0	0	0	1
CB30	0	0	0	1
CB31	0	0	0	1
CB32	0	0	0	1
CB33	0	0	0	1
CB34	0	0	0	1
CB35	0	0	0	1
CB36	0	0	0	1
CB37	0	0	0	1
CB38	0	0	0	1
CB4	0	0	0	1
CB6	0	0	0	1
DW1_CB	0	0	0	1
DW2_CB	0	0	0	1
DW3/CB_CB	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
DW4/CB_CB	0	0	0	1
DW5_CB	0	0	0	1
DW6_CB	0	0	0	1
DW7_CB	0	0	0	1
DW8_CB	0	0	0	1
J1	0	0	0	1
J10	0	0	0	1
J100	0	0	0	1
J1048	0	0	0	1
J11	0	0	0	1
J1134	0	0	0	1
J12	0	0	0	1
J121	0	0	0	1
J13	0	0	0	1
J1391	0	0	0	1
J14	0	0	0	1
J15	0	0	0	1
J1563	0	0	0	1
J16	0	0	0	1
J17	0	0	0	1
J18	0	0	0	1
J2	0	0	0	1
J20	0	0	0	1
J22	0	0	0	1
J23	0	0	0	1
J25	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J26	0	0	0	1
J27	0	0	0	1
J28	0	0	0	1
J29	0	0	0	1
J3	0	0	0	1
J30	0	0	0	1
J31	0	0	0	1
J32	0	0	0	1
J4	0	0	0	1
J417	0	0	0	1
J445	0	0	0	1
J5	0	0	0	1
J564	0	0	0	1
J6	0	0	0	1
J611	0	0	0	1
J66	0	0	0	1
J7	0	0	0	1
J739	0	0	0	1
J8	0	0	0	1
J9	0	0	0	1
MH1	0	0	0	1
MH10	0	0	0	1
MH11	0	0	0	1
MH12	0	0	0	1
MH13	0	0	0	1
MH14	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
MH15	0	0	0	1
MH16	0	0	0	1
MH17	0	0	0	1
MH18	0	0	0	1
MH2	0	0	0	1
MH3	0	0	0	1
MH4	0	0	0	1
MH5	0	0	0	1
MH8	0	0	0	1
MH9	0	0	0	1
OF-SP-1-WJ	0	0	0	1

Table 3A: Orifices

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)
OR103	CB105	J66		BOTTOM	RECT_CLOSED	2	2	2.054	0.65	NO	0	NO	6.53	10/31/2018 12:20 PM
OR104	CB104	J445		BOTTOM	RECT_CLOSED	2	2	4.439	0.65	NO	0	NO	4.72	10/31/2018 12:10 PM
OR105	CB112	J564		BOTTOM	RECT_CLOSED	2	2	3.838	0.65	NO	0	NO	0.79	10/31/2018 12:02 PM
OR35	J100	J1133		BOTTOM	RECT_CLOSED	2	2	2.067	0.65	NO	0	NO	12.4	10/31/2018 12:15 PM

Level 2

Table 3B: Orifices

Name	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OR103	0	0	0	0	3.694	0	1
OR104	0	0	0	0	3.422	0	1
OR105	0	0	0	0	3.186	0	1
OR35	0	0	0	0	4.158	0	1

Table 4A: Outfalls

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Tide Gate	Route To	Type	Fixed Stage (ft)	Curve Name	Series Name	Outlet	Baseline (cfs)	Baseline Pattern
OF-RS-10-S	1008709.714	2846286.735	Zone1	NO	NO	23.64	26.1	NO		FREE	0	*	*		0	
OF-RS-11-N	1008997.279	2846761.397	Zone1	NO	NO	18.64	21.1	NO		FREE	0	*	*		0	
OF-RS-12-N	1009705.646	2847331.275	Zone1	NO	NO	4.5	7.3	NO		FREE	0	*	*		0	
OF-RS-13-S	1010007.673	2847359.187	Zone1	NO	NO	4.12	8.86	NO		FREE	0	*	*		0	
OF-RS-1-N	1005291.471	2844369.017		NO	NO	12.17	12.17	NO		FREE	0	*	*		0	
OF-RS-2-N	1005381.777	2844473.665		NO	NO	7.26	7.26	NO		FREE	0	*	*		0	
OF-RS-3-N	1005823.967	2844899.856		NO	NO	19.37	19.37	NO		FREE	0	*	*		0	
OF-RS-4-S	1006279.282	2844959.564		NO	NO	11.15	11.15	NO		FREE	0	*	*		0	
OF-RS-5-S	1006567.492	2845149.66		NO	NO	10.22	10.22	NO		FREE	0	*	*		0	
OF-RS-6-N	1006807.849	2845520.893	Zone1	NO	NO	25.67	25.67	NO		FREE	0	*	*		0	
OF-RS-7-S	1007261.284	2845510.96	Zone1	NO	NO	25.15	25.15	NO		FREE	0	*	*		0	
OF-RS-8-N	1007630.539	2845893.742	Zone1	NO	NO	30.08	30.08	NO		FREE	0	*	*		0	
OF-RS-9-N	1007998.589	2846072.311	Zone1	NO	NO	33.13	33.13	NO		FREE	0	*	*		0	

Table 4B: Outfalls

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-10-S		1	0						0	0.01	0.2	23.84	10/31/2018 12:05 PM	0.2
OF-RS-11-N		1	0						0	0.03	0.37	19.01	10/31/2018 12:10 PM	0.37
OF-RS-12-N		1	0						0	0.06	1	5.5	10/31/2018 12:02 PM	1
OF-RS-13-S		1	0						0	0.12	1	5.12	10/31/2018 11:50 AM	1
OF-RS-1-N		1	0						0	0.02	0.29	12.46	10/31/2018 12:05 PM	0.29
OF-RS-2-N		1	0						0	0.04	0.55	7.81	10/31/2018 12:05 PM	0.54
OF-RS-3-N		1	0						0	0.05	0.67	20.04	10/31/2018 12:05 PM	0.67
OF-RS-4-S		1	0						0	0.02	0.28	11.43	10/31/2018 12:10 PM	0.28
OF-RS-5-S		1	0						0	0.02	0.24	10.46	10/31/2018 12:05 PM	0.24
OF-RS-6-N		1	0						0	0.03	0.37	26.04	10/31/2018 12:05 PM	0.36
OF-RS-7-S		1	0						0	0.04	0.43	25.58	10/31/2018 12:20 PM	0.43
OF-RS-8-N		1	0						0	0.02	0.24	30.32	10/31/2018 12:05 PM	0.24
OF-RS-9-N		1	0						0	0.02	0.19	33.32	10/31/2018 12:05 PM	0.19

Table 4C: Outfalls

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-10-S	0	0.95	0	0.026	0	0	0	0	0	0	0	0	31.29	0.07	0.95	0.026
OF-RS-11-N	0	2.22	0	0.079	0	0	0	0	0	0	0	0	28.49	0.22	2.22	0.079
OF-RS-12-N	0	9.05	0	0.295	0	0	0	0	0	0	0	0	31.95	0.72	9.05	0.295
OF-RS-13-S	16.65	25.17	0.483	1.04	0	0	0	0	0	0	0	0	41.47	1.97	25.17	1.041
OF-RS-1-N	0	1.13	0	0.032	0	0	0	0	0	0	0	0	36.92	0.07	1.13	0.031
OF-RS-2-N	0	4.05	0	0.118	0	0	0	0	0	0	0	0	45.88	0.2	4.05	0.118
OF-RS-3-N	0	4.14	0	0.114	0	0	0	0	0	0	0	0	34.35	0.26	4.14	0.114

Table 4C: Outfalls (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-4-S	0	2.38	0	0.085	0	0	0	0	0	0	0	0	30.54	0.22	2.38	0.085
OF-RS-5-S	0	1.97	0	0.054	0	0	0	0	0	0	0	0	34.88	0.12	1.97	0.054
OF-RS-6-N	0	1.54	0	0.044	0	0	0	0	0	0	0	0	33.12	0.1	1.54	0.044
OF-RS-7-S	0	3.32	0	0.144	0	0	0	0	0	0	0	0	32.09	0.35	3.32	0.144
OF-RS-8-N	0	0.9	0	0.027	0	0	0	0	0	0	0	0	43.82	0.05	0.9	0.027
OF-RS-9-N	0	0.47	0.001	0.014	0	0	0	0	0	0	0	0	40.02	0.03	0.47	0.014

Table 4D: Outfalls

Name	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OF-RS-10-S	0	0	0	0	0	1
OF-RS-11-N	0	0	0	0	0	1
OF-RS-12-N	0	0	0	0	0	1
OF-RS-13-S	0	0	0	0	0	1
OF-RS-1-N	0	0	0	0	0	1
OF-RS-2-N	0	0	0	0	0	1
OF-RS-3-N	0	0	0	0	0	1
OF-RS-4-S	0	0	0	0	0	1
OF-RS-5-S	0	0	0	0	0	1
OF-RS-6-N	0	0	0	0	0	1
OF-RS-7-S	0	0	0	0	0	1
OF-RS-8-N	0	0	0	0	0	1
OF-RS-9-N	0	0	0	0	0	1

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Table 5A: Conduits

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C1	CB105	CB104		263.405	0.014	0	0	0	0	0.5	0	0	0	NO
C10	J20	J23		207.904	0.014	0	0	0	0	0.5	0	0	0	NO
C1046	J1414	J358	2D_Winthrop	25.153	0.011	0	0	0	0	0	0	0	0	NO
C1075	J1394	J358	2D_Winthrop	19.627	0.011	0	0	0	0	0	0	0	0	NO
C1076	J1371	J358	2D_Winthrop	22.144	0.011	0	0	0	0	0	0	0	0	NO
C11	CB4	CB3		28.475	0.014	0	0	0	0	0.5	0	0	0	NO
C1106	J1372	J359	2D_Winthrop	26.203	0.011	0	0	0	0	0	0	0	0	NO
C111	J66	J445		263.845	0.011	0	0	0	0	0	0	0	0	NO
C1146	J1372	J350	2D_Winthrop	26.17	0.011	0	0	0	0	0	0	0	0	NO
C1192	J1371	J350	2D_Winthrop	21.554	0.011	0	0	0	0	0	0	0	0	NO
C12	CB3	CB2		48.17	0.014	0	0	0	0	0.5	0	0	0	NO
C1202	J1350	J350	2D_Winthrop	16.278	0.011	0	0	0	0	0	0	0	0	NO
C13	CB2	CB1		25.561	0.014	0	0	0	0	0.5	0	0	0	NO
C16	MH5	CB6		111.613	0.014	0	0	0	0	0.5	0	0	0	NO
C17	CB6	MH3		140.635	0.014	0	0	0	0	0.5	0	0	0	NO
C18	MH18	WinthropPond	Zone6	525.428	0.01	0	0	0	0	0	0	0	0	NO
C2	CB104	CB112		471.237	0.014	0	0	0	0	0.5	0	0	0	NO
C2192	J1128	J207	2D_Court	26.183	0.011	0	0	0	0	0	0	0	0	NO
C2193	J1128	J206	2D_Court	23.535	0.011	0	0	0	0	0	0	0	0	NO
C2201	J1129	J207	2D_Court	23.818	0.011	0	0	0	0	0	0	0	0	NO
C2215	J1127	J206	2D_Court	22.139	0.011	0	0	0	0	0	0	0	0	NO
C2268	J1109	J206	2D_Court	23.545	0.011	0	0	0	0	0	0	0	0	NO
C2302	J1094	J206	2D_Court	25.776	0.011	0	0	0	0	0	0	0	0	NO
C2325	J1094	J199	2D_Court	21.342	0.011	0	0	0	0	0	0	0	0	NO
C2386	J1073	J199	2D_Court	20.667	0.011	0	0	0	0	0	0	0	0	NO
C2406	J189	J199	2D_Court	24.248	0.15	0	0	0	0	0	0	0	0	NO

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C27	J23	OF-RS-2-N		16.68	0.014	0	0	0	0	0.5	0	0	0	NO
C3	CB112	MH4		247.996	0.014	0	0	0	0	0.5	0	0	0	NO
C31	CB36	J32		47.227	0.014	0	0	0	0	0.5	0	0	0	NO
C32	CB23	CB34		62.955	0.011	0	0	0	0	0.5	0	0	0	NO
C33	CB24	WinthropPond	Zone6	88.47	0.011	0	0	0	0	0.5	0	0	0	NO
C34	CB34	CB24		44.772	0.011	0	0	0	0	0.5	0	0	0	NO
C37	CB30	DW#9		15.234	0.014	0	0	0	0	0.5	0	0	0	NO
C38	CB29	DW#9		20.886	0.014	0	0	0	0	0.5	0	0	0	NO
C39	CB27	MH18		54.24	0.014	0	0	0	0	0.5	0	0	0	NO
C4	MH4	CB101		119.245	0.014	0	0	0	0	0.5	0	0	0	NO
C40	MH8	MH9		25.283	0.014	0	0	0	0	0.5	0	0	0	NO
C41	MH9	MH10		23.109	0.014	0	0	0	0	0.5	0	0	0	NO
C42	MH10	MH18		39.24	0.014	0	0	0	0	0.5	0	0	0	NO
C43	CB33	MH18		40.72	0.014	0	0	0	0	0.5	0	0	0	NO
C44	CB28	MH18		27.307	0.014	0	0	0	0	0.5	0	0	0	NO
C45	MH11	MH18		122.435	0.014	0	0	0	0	0.5	0	0	0	NO
C46	MH12	MH11		84.66	0.014	0	0	0	0	0.5	0	0	0	NO
C464	J422	J421	2D_SouthShankPainter	29.38	0.15	0	0	0	0	0	0	0	0	NO
C47	CB31	MH11		13.987	0.014	0	0	0	0	0.5	0	0	0	NO
C472	J410	J421	2D_SouthShankPainter	27.713	0.15	0	0	0	0	0	0	0	0	NO
C48	CB32	MH11		53.849	0.014	0	0	0	0	0.5	0	0	0	NO
C49	MH14	MH13		212.01	0.014	0	0	0	0	0.5	0	0	0	NO
C5	CB101	MH3		43.639	0.014	0	0	0	0	0.5	0	0	0	NO
C50	MH13	MH12		219.97	0.014	0	0	0	0	0.5	0	0	0	NO
C51	MH16	MH15		116.201	0.014	0	0	0	0	0.5	0	0	0	NO
C512	J410	J409	2D_SouthShankPainter	27.174	0.15	0	0	0	0	0	0	0	0	NO

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Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C52	MH15	MH18		432.199	0.014	0	0	0	0	0.5	0	0	0	NO
C53	MH17	MH16		134.35	0.014	0	0	0	0	0.5	0	0	0	NO
C54	CB37	CB36		48.25	0.014	0	0	0	0	0.5	0	0	0	NO
C5450	DW8_CB	CourtStWetlandArea	Zone4	83.766	0.024	4.41	4.06	0	0	0	0	0	0	NO
C5451	J100	CourtStWetlandArea	Zone4	185.585	0.011	0	0	0	0	0	0	0	0	NO
C5452	CB1	MH1		12.777	0.014	0	0	0	0	0	0	0	0	NO
C5453	MH1	OF-SP-1-WJ		20.094	0.014	0	0	0	0	0	0	0	0	NO
C5454	MH2	MH1		190.137	0.014	0	0	0	0	0	0	0	0	NO
C5455	MH3	MH2		114.494	0.014	0	0	0	0	0	0	0	0	NO
C547	J1551	J409	2D_SouthShankPainter	22.535	0.011	0	0	0	0	0	0	0	0	NO
C55	CB38	CB37		20.613	0.014	0	0	0	0	0.5	0	0	0	NO
C56	CB35	J32		19.765	0.014	0	0	0	0	0.5	0	0	0	NO
C57	J18	OF-RS-1-N		45.993	0.014	0	0	0	0	0.5	0	0	0	NO
C58	J22	J23		125.62	0.014	0	0	0	0	0.5	0	0	0	NO
C59	J11	J13		35.428	0.014	0	0	0	0	0.5	0	0	0	NO
C60	J13	OF-RS-3-N		122.618	0.014	0	0	0	0	0.5	0	0	0	NO
C605	J1539	J397	2D_SouthShankPainter	26.212	0.011	0	0	0	0	0	0	0	0	NO
C607	J1527	J397	2D_SouthShankPainter	26.943	0.011	0	0	0	0	0	0	0	0	NO
C61	J5	J8		70.68	0.014	0	0	0	0	0.5	0	0	0	NO
C62	J8	OF-RS-4-S		67.751	0.014	0	0	0	0	0.5	0	0	0	NO
C6389	DW1_CB	DW1		15	0.01	0	0	0	0	0	0	0	0	NO
C64	J4	J7		70.823	0.014	0	0	0	0	0.5	0	0	0	NO
C65	J7	OF-RS-5-S		67.331	0.014	0	0	0	0	0.5	0	0	0	NO
C650	J1510	J389	2D_SouthShankPainter	18.564	0.011	0	0	0	0	0	0	0	0	NO
C66	J3	J1		75.518	0.014	0	0	0	0	0.5	0	0	0	NO
C67	J1	OF-RS-6-N	Zone1	64.921	0.014	0	0	0	0	0.5	0	0	0	NO

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Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C68	J6	J2		76.875	0.014	0	0	0	0	0.5	0	0	0	NO
C6814	J445	J611		301.421	0.011	0	0	0	0	0	0	0	0	NO
C6815	J611	J564		169.498	0.011	0	0	0	0	0	0	0	0	NO
C6816	J564	J661		29.034	0.011	0	0	0	0	0	0	0	0	NO
C69	J2	OF-RS-11-N	Zone1	52.784	0.014	0	0	0	0	0.5	0	0	0	NO
C70	J9	J10		77.687	0.014	0	0	0	0	0.5	0	0	0	NO
C71	J10	OF-RS-10-S	Zone1	69.271	0.014	0	0	0	0	0.5	0	0	0	NO
C7140	DW2_CB	DW2		15	0.01	0	0	0	0	0	0	0	0	NO
C7141	DW3/CB_CB	DW3/CB		15	0.01	0	0	0	0	0	0	0	0	NO
C7142	DW5_CB	DW5		15	0.01	0	0	0	0	0	0	0	0	NO
C7143	DW6_CB	DW6		15	0.01	0	0	0	0	0	0	0	0	NO
C7144	DW7_CB	DW7		15	0.01	0	0	0	0	0	0	0	0	NO
C7145	DW8_CB	DW8		15	0.01	0	0	0	0	0	0	0	0	NO
C7146	DW4/CB_CB	DW4/CB		15	0.01	0	0	0	0	0	0	0	0	NO
C7147	OF-SP-1-WJ	DuckPond	Zone2	20	0.014	0	0	0	0	0.5	0	0.5	0	NO
C72	J17	J16		75.234	0.014	0	0	0	0	0.5	0	0	0	NO
C73	J16	OF-RS-9-N	Zone1	53.115	0.014	0	0	0	0	0.5	0	0	0	NO
C74	J15	J14		75.097	0.014	0	0	0	0	0.5	0	0	0	NO
C75	J14	OF-RS-8-N	Zone1	60.067	0.014	0	0	0	0	0.5	0	0	0	NO
C76	J25	J26		70.204	0.014	0	0	0	0	0.5	0	0	0	NO
C77	J26	OF-RS-7-S	Zone1	74.453	0.014	0	0	0	0	0.5	0	0	0	NO
C78	J31	J30		52.913	0.014	0	0	0	0	0.5	0	0	0	NO
C79	J30	OF-RS-13-S	Zone1	50.854	0.014	0	0	0	0	0.5	0	0	0	NO
C80	J27	J28		84.437	0.014	0	0	0	0	0.5	0	0	0	NO
C81	J28	J32	Zone1	401.87	0.014	0	0	0	0	0.5	0	0	0	NO
C82	J29	J28		113.251	0.014	0	0	0	0	0.5	0	0	0	NO

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Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C83	J32	OF-RS-12-N	Zone1	21.49	0.014	0	0	0	0	0.5	0	0	0	NO
C9	J12	J20		67.86	0.014	0	0	0	0	0.5	0	0	0	NO

Table 5B: Conduits

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C1	CIRCULAR	1	0	0	0	1				NO		NO	0.02313	3.87
C10	CIRCULAR	1	0	0	0	1				NO		NO	0.03851	3.21
C1046	RECT_OPEN	30	19.348	2	0	1				NO		NO	0.05722	0
C1075	RECT_OPEN	30	16.356	2	0	1				NO		NO	0.04938	0
C1076	RECT_OPEN	30	17.034	2	0	1				NO		NO	0.04684	0
C11	CIRCULAR	1	0	0	0	1				NO		NO	0.00808	0.04
C1106	RECT_OPEN	30	18.716	2	0	1				NO		NO	0.04087	0
C111	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.01404	6.5
C1146	RECT_OPEN	30	18.693	2	0	1				NO		NO	0.04092	0
C1192	RECT_OPEN	30	17.962	2	0	1				NO		NO	0.04812	0
C12	CIRCULAR	1	0	0	0	1				NO		NO	0.00104	0.13
C1202	RECT_OPEN	30	12.521	2	0	1				NO		NO	0.0484	10.16
C13	CIRCULAR	1	0	0	0	1				NO		NO	0.01956	2.52
C16	CIRCULAR	1	0	0	0	1				NO		NO	0.00332	0.97
C17	CIRCULAR	1	0	0	0	1				NO		NO	0.00711	3.46
C18	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00784	12.4
C2	CIRCULAR	1	0	0	0	1				NO		NO	0.00541	2.98
C2192	RECT_OPEN	30	18.702	2	0	1				NO		NO	0.11725	0.01

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Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C2193	RECT_OPEN	30	18.104	2	0	1				NO		NO	0.13065	0.01
C2201	RECT_OPEN	30	19.848	2	0	1				NO		NO	0.0917	0.01
C2215	RECT_OPEN	30	17.03	2	0	1				NO		NO	0.20692	0.05
C2268	RECT_OPEN	30	19.621	2	0	1				NO		NO	0.26381	0.11
C2302	RECT_OPEN	30	19.828	2	0	1				NO		NO	0.26004	0.68
C2325	RECT_OPEN	30	17.785	2	0	1				NO		NO	0.31905	0.68
C2386	RECT_OPEN	30	17.222	2	0	1				NO		NO	0.35436	8.82
C2406	RECT_OPEN	30	20.207	2	0	1				NO		NO	0.32717	3.31
C27	CIRCULAR	1	0	0	0	1				NO		NO	0.04441	4.05
C3	CIRCULAR	1	0	0	0	1				NO		NO	0.00464	3.17
C31	CIRCULAR	1	0	0	0	1				NO		NO	0.03157	2.34
C32	CIRCULAR	1	0	0	0	1				NO		NO	0.0108	2.03
C33	CIRCULAR	1	0	0	0	1				NO		NO	0.01798	3.14
C34	CIRCULAR	1	0	0	0	1				NO		NO	0.00156	3
C37	CIRCULAR	1	0	0	0	1				NO		NO	0.28829	0.9
C38	CIRCULAR	1	0	0	0	1				NO		NO	0.18151	0.91
C39	CIRCULAR	1	0	0	0	1				NO		NO	0.04392	0.37
C4	CIRCULAR	1	0	0	0	1				NO		NO	0.01048	4.06
C40	CIRCULAR	1	0	0	0	1				NO		NO	0.00435	0.09
C41	CIRCULAR	1	0	0	0	1				NO		NO	-0.00606	0.18
C42	CIRCULAR	1	0	0	0	1				NO		NO	0.06692	0.26
C43	CIRCULAR	1	0	0	0	1				NO		NO	-0.00172	6.95
C44	CIRCULAR	1	0	0	0	1				NO		NO	-0.00439	0.44
C45	CIRCULAR	1	0	0	0	1				NO		NO	0.01944	4.99
C46	CIRCULAR	1	0	0	0	1				NO		NO	0.0473	4.22
C464	RECT_OPEN	30	20.986	2	0	1				NO		NO	0.11675	0.21

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Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C47	CIRCULAR	1	0	0	0	1				NO		NO	0.06088	0.95
C472	RECT_OPEN	30	23.094	2	0	1				NO		NO	0.10717	0.73
C48	CIRCULAR	1	0	0	0	1				NO		NO	0.0039	1.57
C49	CIRCULAR	0.833	0	0	0	1				NO		NO	0.03304	0.67
C5	CIRCULAR	1	0	0	0	1				NO		NO	0.01146	4.12
C50	CIRCULAR	1	0	0	0	1				NO		NO	0.05463	2.31
C51	CIRCULAR	1	0	0	0	1				NO		NO	0.0043	1.89
C512	RECT_OPEN	30	20.903	2	0	1				NO		NO	0.17295	1.06
C52	CIRCULAR	1	0	0	0	1				NO		NO	0.04489	2.31
C53	CIRCULAR	1	0	0	0	1				NO		NO	0.02189	0.47
C54	CIRCULAR	1	0	0	0	1				NO		NO	0.00497	1.7
C5450	CIRCULAR	1	0	0	0	1				NO		NO	0.07073	1.09
C5451	CIRCULAR	1	0	0	0	1				NO		NO	0.00167	2.66
C5452	CIRCULAR	1	0	0	0	1				NO		NO	0.06667	2.52
C5453	CIRCULAR	1	0	0	0	1				NO		NO	0.00299	8.65
C5454	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00447	6.34
C5455	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00437	6.32
C547	RECT_OPEN	30	17.335	2	0	1				NO		NO	0.19457	6.95
C55	CIRCULAR	1	0	0	0	1				NO		NO	0.03009	1.7
C56	CIRCULAR	1	0	0	0	1				NO		NO	0.06388	0.4
C57	CIRCULAR	1	0	0	0	1				NO		NO	0.03416	1.13
C58	CIRCULAR	1	0	0	0	1				NO		NO	0.05181	0.86
C59	CIRCULAR	1	0	0	0	1				NO		NO	0.00847	1.82
C60	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01085	4.14
C605	RECT_OPEN	30	20.163	2	0	1				NO		NO	0.15568	0.42
C607	RECT_OPEN	30	19.245	2	0	1				NO		NO	0.14871	0.06

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Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C61	CIRCULAR	1	0	0	0	1				NO		NO	0.0099	0.3
C62	CIRCULAR	1	0	0	0	1				NO		NO	0.17455	2.38
C6389	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.13
C64	CIRCULAR	1	0	0	0	1				NO		NO	0.02401	0.94
C65	CIRCULAR	1	0	0	0	1				NO		NO	0.20909	1.97
C650	RECT_OPEN	30	15.47	2	0	1				NO		NO	0.05216	0.01
C66	CIRCULAR	1	0	0	0	1				NO		NO	0.00397	0.75
C67	CIRCULAR	1	0	0	0	1				NO		NO	0.02666	1.54
C68	CIRCULAR	1	0	0	0	1				NO		NO	0.00781	2.22
C6814	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00739	10.22
C6815	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00493	19.78
C6816	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00696	20.48
C69	CIRCULAR	1	0	0	0	1				NO		NO	0.05236	2.22
C70	CIRCULAR	1	0	0	0	1				NO		NO	0.01287	0
C71	CIRCULAR	1	0	0	0	1				NO		NO	0.10685	0.95
C7140	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.3
C7141	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.06
C7142	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.24
C7143	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	1.04
C7144	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.9
C7145	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.13
C7146	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.03
C7147	CIRCULAR	1.5	0	0	0	1				NO		NO	0.03352	8.65
C72	CIRCULAR	1	0	0	0	1				NO		NO	0.00798	0.47
C73	CIRCULAR	1	0	0	0	1				NO		NO	0.03523	0.47
C74	CIRCULAR	1	0	0	0	1				NO		NO	0.00266	0.9

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Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C75	CIRCULAR	1	0	0	0	1				NO		NO	0.04867	0.9
C76	CIRCULAR	1	0	0	0	1				NO		NO	0.0057	1.15
C77	CIRCULAR	1	0	0	0	1				NO		NO	0.06663	3.32
C78	CIRCULAR	1	0	0	0	1				NO		NO	0.00567	4.96
C79	CIRCULAR	1	0	0	0	1				NO		NO	0.01337	8.52
C80	CIRCULAR	1	0	0	0	1				NO		NO	0.01149	2.75
C81	CIRCULAR	1	0	0	0	1				NO		NO	0.01911	6.74
C82	CIRCULAR	1	0	0	0	1				NO		NO	0.00327	3.41
C83	CIRCULAR	1	0	0	0	1				NO		NO	0.04658	9.05
C9	CIRCULAR	1	0	0	0	1				NO		NO	0.00737	1.97

Table 5C: Conduits

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C1	10/31/2018 12:25 PM	4.93	0.77	1	0			1	0	0	0	0
C10	10/31/2018 12:05 PM	6.77	0.49	0.58	0			1	0	0	0	0
C1046	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C1075	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C1076	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C11	10/31/2018 11:59 AM	0.08	0.01	1	0			1	0	0	0	0
C1106	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C111	10/31/2018 12:20 PM	2.59	0.07	0.25	0			1	0	0	0	0
C1146	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C1192	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0

Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C12	10/31/2018 11:59 AM	0.22	0.13	1	0			1	0	0	0	0
C1202	10/31/2018 12:18 PM	3.69	0	0.01	0			1	0	0	0	0
C13	10/31/2018 12:05 PM	5.18	0.55	1	0			1	0	0	0	0
C16	10/31/2018 12:05 PM	1.23	0.51	1	0			1	0	0	0	0
C17	10/31/2018 11:59 AM	4.41	1.24	1	0			1	0	0	0	0
C18	10/31/2018 12:05 PM	7.02	1.03	1	0			1	0	0	0	0
C2	10/31/2018 13:20 PM	3.79	1.22	1	0			1	0	0	0	0
C2192	10/31/2018 12:09 PM	0.03	0	0	0			1	0	0	0	0
C2193	10/31/2018 12:09 PM	0	0	0	0			1	0	0	0	0
C2201	10/31/2018 01:12 AM	0.01	0	0	0			1	0	0	0	0
C2215	10/31/2018 12:08 PM	0.02	0	0.01	0			1	0	0	0	0
C2268	10/31/2018 12:08 PM	0.04	0	0.01	0			1	0	0	0	0
C2302	10/31/2018 12:08 PM	0.23	0	0.01	0			1	0	0	0	0
C2325	10/31/2018 12:08 PM	0.15	0	0.01	0			1	0	0	0	0
C2386	10/31/2018 12:07 PM	1.9	0	0.01	0			1	0	0	0	0
C2406	10/31/2018 12:07 PM	0.54	0	0.01	0			1	0	0	0	0
C27	10/31/2018 12:05 PM	8.11	0.58	0.61	0			1	0	0	0	0
C3	10/31/2018 13:05 PM	4.03	1.41	1	0			1	0	0	0	0
C31	10/31/2018 12:05 PM	3.4	0.4	1	0			1	0	0	0	0
C32	10/31/2018 12:05 PM	2.58	0.46	1	0			1	0	0	0	0
C33	10/31/2018 12:05 PM	4	0.56	1	0			1	0	0	0	0
C34	10/31/2018 12:05 PM	3.82	1.8	1	0			1	0	0	0	0
C37	10/31/2018 12:05 PM	1.15	0.05	1	0			1	0	0	0	0
C38	10/31/2018 12:05 PM	1.15	0.06	1	0			1	0	0	0	0
C39	10/31/2018 12:05 PM	0.63	0.05	0.92	0			1	0	0	0	0
C4	10/31/2018 12:34 PM	5.18	1.2	1	0			1	0	0	0	0

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Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C40	10/31/2018 11:59 AM	0.7	0.04	0.68	0			1	0	0	0	0
C41	10/31/2018 11:59 AM	1.45	0.07	0.67	0			1	0	0	0	0
C42	10/31/2018 11:59 AM	0.51	0.03	0.8	0			1	0	0	0	0
C43	10/31/2018 11:50 AM	8.84	5.06	1	0			1	0	0	0	0
C44	10/31/2018 11:54 AM	0.57	0.2	1	0			1	0	0	0	0
C45	10/31/2018 12:09 PM	6.36	1.08	1	0			1	0	0	0	0
C46	10/31/2018 12:05 PM	5.76	0.59	1	0			1	0	0	0	0
C464	10/31/2018 12:06 PM	0.24	0	0	0			1	0	0	0	0
C47	10/31/2018 12:05 PM	1.21	0.12	1	0			1	0	0	0	0
C472	10/31/2018 12:06 PM	0.51	0	0	0			1	0	0	0	0
C48	10/31/2018 12:05 PM	2	0.76	1	0			1	0	0	0	0
C49	10/31/2018 12:05 PM	3.69	0.18	0.37	0			1	0	0	0	0
C5	10/31/2018 12:35 PM	5.24	1.16	1	0			1	0	0	0	0
C50	10/31/2018 12:05 PM	5.81	0.3	0.69	0			1	0	0	0	0
C51	10/31/2018 12:05 PM	4.3	0.87	0.55	0			1	0	0	0	0
C512	10/31/2018 12:06 PM	0.18	0	0.03	0			1	0	0	0	0
C52	10/31/2018 12:05 PM	3.95	0.33	0.7	0			1	0	0	0	0
C53	10/31/2018 12:05 PM	1.36	0.1	0.45	0			1	0	0	0	0
C54	10/31/2018 12:05 PM	3.84	0.73	1	0			1	0	0	0	0
C5450	10/31/2018 12:08 PM	5.18	0.21	0.31	0			1	0	0	0	0
C5451	10/31/2018 12:11 PM	3.39	1.55	1	0			1	0	0	0	0
C5452	10/31/2018 12:05 PM	3.21	0.3	1	0			1	0	0	0	0
C5453	10/31/2018 12:05 PM	11.01	4.78	1	0			1	0	0	0	0
C5454	10/31/2018 12:21 PM	5.17	1.58	1	0			1	0	0	0	0
C5455	10/31/2018 12:21 PM	5.15	1.59	1	0			1	0	0	0	0
C547	10/31/2018 12:07 PM	1.57	0	0.03	0			1	0	0	0	0

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Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C55	10/31/2018 12:05 PM	3.88	0.3	0.93	0			1	0	0	0	0
C56	10/31/2018 12:02 PM	0.93	0.05	1	0			1	0	0	0	0
C57	10/31/2018 12:05 PM	5.74	0.18	0.3	0			1	0	0	0	0
C58	10/31/2018 12:05 PM	2.53	0.11	0.45	0			1	0	0	0	0
C59	10/31/2018 12:05 PM	3.21	0.6	0.68	0			1	0	0	0	0
C60	10/31/2018 12:05 PM	5.29	0.41	0.46	0			1	0	0	0	0
C605	10/31/2018 12:08 PM	0.23	0	0.03	0			1	0	0	0	0
C607	10/31/2018 12:08 PM	0.03	0	0.03	0			1	0	0	0	0
C61	10/31/2018 12:15 PM	2.28	0.09	0.24	0			1	0	0	0	0
C62	10/31/2018 12:10 PM	12.81	0.17	0.29	0			1	0	0	0	0
C6389	10/31/2018 12:05 PM	0.27	0.01	1	0			1	0	0	0	0
C64	10/31/2018 12:05 PM	5.27	0.18	0.28	0			1	0	0	0	0
C65	10/31/2018 12:05 PM	12.97	0.13	0.25	0			1	0	0	0	0
C650	10/31/2018 12:16 PM	0	0	0	0			1	0	0	0	0
C66	10/31/2018 12:05 PM	2.51	0.36	0.41	0			1	0	0	0	0
C67	10/31/2018 12:05 PM	5.75	0.29	0.37	0			1	0	0	0	0
C68	10/31/2018 12:10 PM	5.27	0.76	0.53	0			1	0	0	0	0
C6814	10/31/2018 12:20 PM	2.49	0.14	0.41	0			1	0	0	0	0
C6815	10/31/2018 12:16 PM	3.95	0.34	0.5	0			1	0	0	0	0
C6816	10/31/2018 12:16 PM	5.05	0.3	0.41	0			1	0	0	0	0
C69	10/31/2018 12:10 PM	8.04	0.29	0.38	0			1	0	0	0	0
C70	10/31/2018 00:00 AM	0	0	0.1	0			1	0	0	0	0
C71	10/31/2018 12:05 PM	8.33	0.09	0.2	0			1	0	0	0	0
C7140	10/31/2018 12:15 PM	1	0.02	1	0			1	0	0	0	0
C7141	10/31/2018 12:05 PM	0.2	0	1	0			1	0	0	0	0
C7142	10/31/2018 12:05 PM	0.91	0.01	1	0			1	0	0	0	0

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Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C7143	10/31/2018 12:05 PM	1.32	0.06	1	0			1	0	0	0	0
C7144	10/31/2018 12:00 PM	1.15	0.05	1	0			1	0	0	0	0
C7145	10/31/2018 11:27 AM	0.38	0.01	1	0			1	0	0	0	0
C7146	10/31/2018 10:05 AM	0.23	0	1	0			1	0	0	0	0
C7147	10/31/2018 12:05 PM	14.55	0.48	0.37	0			1	0	0	0	0
C72	10/31/2018 12:05 PM	3.32	0.16	0.24	0			1	0	0	0	0
C73	10/31/2018 12:05 PM	4.59	0.08	0.19	0			1	0	0	0	0
C74	10/31/2018 12:05 PM	3.54	0.53	0.36	0			1	0	0	0	0
C75	10/31/2018 12:05 PM	6.18	0.12	0.24	0			1	0	0	0	0
C76	10/31/2018 12:05 PM	3.4	0.46	0.44	0			1	0	0	0	0
C77	10/31/2018 12:20 PM	9.85	0.39	0.44	0			1	0	0	0	0
C78	10/31/2018 12:33 PM	6.32	1.99	1	0			1	0	0	0	0
C79	10/31/2018 12:05 PM	10.85	2.23	1	0			1	0	0	0	0
C80	10/31/2018 12:05 PM	3.56	0.78	1	0			1	0	0	0	0
C81	10/31/2018 12:05 PM	8.58	1.47	1	0			1	0	0	0	0
C82	10/31/2018 12:05 PM	4.35	1.81	1	0			1	0	0	0	0
C83	10/31/2018 12:05 PM	11.53	1.27	1	0			1	0	0	0	0
C9	10/31/2018 12:05 PM	4.31	0.69	0.56	0			1	0	0	0	0

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Table 5D: Conduits

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C1	AUTOMATIC	1.04	1.04	2.09	0.01	0.01	1	0.57	0.16	0.22	0.85	0	0
C10	AUTOMATIC	0	0	0	0	0	1	0.04	0	0.47	0.89	0	0
C1046	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C1075	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C1076	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C11	AUTOMATIC	0.01	0.01	0.14	0.01	0.01	1	0.67	0.02	0	0.74	0	0
C1106	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C111	AUTOMATIC	0	0	0	0	0	1	0.88	0.04	0.01	0.75	0	0
C1146	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C1192	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0	0
C12	AUTOMATIC	0.14	0.14	0.16	0.01	0.01	1	0.14	0.33	0	0.5	0	0
C1202	AUTOMATIC	0	0	0	0	0	1	0.25	0.75	0	0.75	0	0
C13	AUTOMATIC	0.16	0.16	0.44	0.01	0.01	1	0.14	0.53	0.33	0.01	0	0
C16	AUTOMATIC	0.82	0.82	0.97	0.01	0.01	1	0.64	0.35	0	0.8	0	0
C17	AUTOMATIC	0.97	0.97	1.9	0.34	0.45	1	0.5	0.36	0	0.81	0	0
C18	AUTOMATIC	0.52	0.52	36.94	0.16	0.16	1	0.02	0.84	0.14	0.84	0	0
C2	AUTOMATIC	2.09	2.09	2.15	2.03	2.03	1	0.05	0.42	0.01	0.77	0	0
C2192	AUTOMATIC	0	0	0	0	0	1	0.03	0.64	0	0.97	0	0
C2193	AUTOMATIC	0	0	0	0	0	1	0.02	0.64	0	0.97	0	0
C2201	AUTOMATIC	0	0	0	0	0	1	0.03	0.51	0	0.97	0	0
C2215	AUTOMATIC	0	0	0	0	0	1	0.02	0.85	0	0.98	0	0
C2268	AUTOMATIC	0	0	0	0	0	1	0.02	0.63	0	0.98	0	0
C2302	AUTOMATIC	0	0	0	0	0	1	0.02	0.63	0	0.98	0	0
C2325	AUTOMATIC	0	0	0	0	0	1	0.02	0.63	0	0.98	0	0
C2386	AUTOMATIC	0	0	0	0	0	1	0.02	0.98	0	0.98	0	0
C2406	AUTOMATIC	0	0	0	0	0	1	0.02	0.98	0	0.98	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C27	AUTOMATIC	0	0	0	0	0	1	0.04	0.49	0.47	0	0	0
C3	AUTOMATIC	1.91	2.15	1.95	1.54	1.25	1	0.05	0.93	0	0.61	0	0
C31	AUTOMATIC	0.08	0.08	0.27	0.01	0.01	1	0.05	0.27	0.01	0.77	0	0
C32	AUTOMATIC	0.36	0.36	36.19	0.01	0.01	1	0.07	0.93	0	0.17	0	0
C33	AUTOMATIC	36.2	36.2	37.76	0.01	0.01	1	0.03	0.91	0.02	0.17	0	0
C34	AUTOMATIC	36.19	36.19	36.2	0.34	0.47	1	0.07	0.87	0.06	0	0	0
C37	AUTOMATIC	43.07	43.07	45.24	0.01	0.01	1	0.02	0.97	0.01	0.07	0	0
C38	AUTOMATIC	43.26	43.26	45.24	0.01	0.01	1	0.02	0.97	0	0.06	0	0
C39	AUTOMATIC	0.01	0.01	0.72	0.01	0.01	1	0.02	0.95	0	0.97	0	0
C4	AUTOMATIC	1.93	1.95	2	1.61	1.85	1	0.05	0.64	0.31	0.57	0	0
C40	AUTOMATIC	0	0	0	0	0	1	0.25	0.75	0	0	0	0
C41	AUTOMATIC	0	0	0	0	0	1	0.25	0.14	0	0.63	0	0
C42	AUTOMATIC	0.01	0.01	0.59	0.01	0.01	1	0.02	0.02	0	0.75	0	0
C43	AUTOMATIC	0.72	0.72	1.26	2.97	0.01	1	0.02	0.98	0	0.01	0	0
C44	AUTOMATIC	0.72	0.72	0.79	0.01	0.01	1	0.02	0.98	0	0.01	0	0
C45	AUTOMATIC	0.34	0.34	0.72	0.2	0.23	1	0.02	0.48	0.01	0.96	0	0
C46	AUTOMATIC	0.11	0.11	0.34	0.01	0.01	1	0.51	0.01	0.48	0.97	0	0
C464	AUTOMATIC	0	0	0	0	0	1	0.13	0.02	0	0.76	0	0
C47	AUTOMATIC	0.28	0.28	0.34	0.01	0.01	1	0.51	0.01	0	0.74	0	0
C472	AUTOMATIC	0	0	0	0	0	1	0.12	0.39	0	0.66	0	0
C48	AUTOMATIC	0.32	0.32	0.34	0.01	0.01	1	0.51	0.4	0	0.87	0	0
C49	AUTOMATIC	0	0	0	0	0	1	0.02	0.61	0.3	0.91	0	0
C5	AUTOMATIC	1.86	2	1.9	1.19	1.73	1	0.06	0.93	0.01	0.65	0	0
C50	AUTOMATIC	0.01	0.01	0.11	0.01	0.01	1	0.02	0.5	0.48	0.97	0	0
C51	AUTOMATIC	0	0	0	0	0	1	0.5	0.15	0.35	0.49	0	0
C512	AUTOMATIC	0	0	0	0	0	1	0.12	0.39	0	0.88	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C52	AUTOMATIC	0.01	0.01	0.72	0.01	0.01	1	0.02	0.49	0	0.98	0	0
C53	AUTOMATIC	0	0	0	0	0	1	0.51	0.49	0	0.98	0	0
C54	AUTOMATIC	0.06	0.06	0.08	0.01	0.01	1	0.23	0.52	0.25	0.5	0	0
C5450	AUTOMATIC	0	0	0	0	0	1	0.24	0	0	0	0	0
C5451	AUTOMATIC	37.05	37.05	37.26	2.35	0.01	1	0.02	0.97	0	0.13	0	0
C5452	AUTOMATIC	0.44	0.44	1.73	0.01	0.01	1	0.06	0.36	0	0.82	0	0
C5453	AUTOMATIC	0.14	1.73	0.14	4.39	0.14	1	0.06	0.62	0.33	0.08	0	0
C5454	AUTOMATIC	0.93	1.27	0.93	1.81	0.93	1	0.06	0.49	0	0.89	0	0
C5455	AUTOMATIC	1.27	1.37	1.27	1.85	1.27	1	0.5	0.5	0	0.55	0	0
C547	AUTOMATIC	0	0	0	0	0	1	0.12	0.87	0.01	0.88	0	0
C55	AUTOMATIC	0.01	0.01	0.06	0.01	0.01	1	0.23	0.01	0.26	0.74	0	0
C56	AUTOMATIC	0.07	0.07	0.27	0.01	0.01	1	0.05	0.01	0	0.75	0	0
C57	AUTOMATIC	0	0	0	0	0	1	0.12	0.5	0.38	0	0	0
C58	AUTOMATIC	0	0	0	0	0	1	0.04	0.39	0	0.88	0	0
C59	AUTOMATIC	0	0	0	0	0	1	0.16	0.35	0	0.79	0	0
C60	AUTOMATIC	0	0	0	0	0	1	0.16	0.5	0.35	0	0	0
C605	AUTOMATIC	0	0	0	0	0	1	0.12	0.54	0	0.88	0	0
C607	AUTOMATIC	0	0	0	0	0	1	0.12	0.34	0	0.88	0	0
C61	AUTOMATIC	0	0	0	0	0	1	0.2	0.02	0.24	0.51	0	0
C62	AUTOMATIC	0	0	0	0	0	1	0.2	0.49	0.31	0	0	0
C6389	AUTOMATIC	36.72	36.72	39.85	0.01	0.01	1	0.06	0.93	0.01	0.15	0	0
C64	AUTOMATIC	0	0	0	0	0	1	0.15	0.5	0.34	0.51	0	0
C65	AUTOMATIC	0	0	0	0	0	1	0.15	0.5	0.36	0.01	0	0
C650	AUTOMATIC	0	0	0	0	0	1	0.55	0.09	0.01	0.18	0	0
C66	AUTOMATIC	0	0	0	0	0	1	0.16	0.84	0	0.5	0	0
C67	AUTOMATIC	0	0	0	0	0	1	0.16	0.49	0.34	0	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C68	AUTOMATIC	0	0	0	0	0	1	0.05	0.67	0.28	0.64	0	0
C6814	AUTOMATIC	0	0	0	0	0	1	0.55	0.12	0	0.75	0	0
C6815	AUTOMATIC	0	0	0	0	0	1	0.49	0.35	0.11	0.52	0	0
C6816	AUTOMATIC	0	0	0	0	0	1	0.1	0.36	0.13	0.8	0	0
C69	AUTOMATIC	0	0	0	0	0	1	0.07	0.64	0.29	0	0	0
C70	AUTOMATIC	0	0	0	0	0	1	0.18	0	0	0	0	0
C71	AUTOMATIC	0	0	0	0	0	1	0.18	0.5	0.32	0	0	0
C7140	AUTOMATIC	35.73	35.73	37.03	0.01	0.01	1	0.11	0.86	0.03	0.13	0	0
C7141	AUTOMATIC	35.95	35.95	39.23	0.01	0.01	1	0.02	0.98	0	0.22	0	0
C7142	AUTOMATIC	33.95	33.95	36.28	0.01	0.01	1	0.03	0.94	0.03	0.17	0	0
C7143	AUTOMATIC	36.71	36.71	38.8	0.01	0.01	1	0.02	0.94	0.04	0.19	0	0
C7144	AUTOMATIC	36.99	36.99	39.16	0.01	0.01	1	0.02	0.94	0.04	0.18	0	0
C7145	AUTOMATIC	37.85	37.85	39.86	0.01	0.01	1	0.02	0.97	0.01	0.17	0	0
C7146	AUTOMATIC	39.82	39.82	43.42	0.01	0.01	1	0.02	0.98	0	0.12	0	0
C7147	AUTOMATIC	0	0	0	0	0	1	0.06	0.28	0.23	0.56	0	0
C72	AUTOMATIC	0	0	0	0	0	1	0.08	0.54	0.38	0.5	0	0
C73	AUTOMATIC	0	0	0	0	0	1	0.08	0.5	0.42	0	0	0
C74	AUTOMATIC	0	0	0	0	0	1	0.05	0.87	0.08	0.49	0	0
C75	AUTOMATIC	0	0	0	0	0	1	0.05	0.49	0.45	0	0	0
C76	AUTOMATIC	0	0	0	0	0	1	0.19	0.29	0.01	0.77	0	0
C77	AUTOMATIC	0	0	0	0	0	1	0.19	0.47	0.33	0	0	0
C78	AUTOMATIC	1.11	1.16	1.11	1.25	1.11	1	0.05	0.37	0	0.68	0	0
C79	AUTOMATIC	0.75	1.11	0.75	1.13	0.75	1	0.05	0.55	0.4	0	0	0
C80	AUTOMATIC	0.24	0.24	0.28	0.01	0.01	1	0.05	0.1	0.24	0.78	0	0
C81	AUTOMATIC	0.26	0.28	0.27	0.31	0.26	1	0.05	0.64	0.31	0.64	0	0
C82	AUTOMATIC	0.28	0.33	0.28	0.34	0.28	1	0.05	0.32	0.01	0.71	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C83	AUTOMATIC	0.19	0.27	0.19	0.19	0.19	1	0.05	0.62	0.33	0	0	0
C9	AUTOMATIC	0	0	0	0	0	1	0.03	0.65	0.32	0.5	0	0

Table 5E: Conduits

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C1	0		0	0	0	0	0	0	0	0	0	0
C10	0		0	0	0	0	0	0	0	0	0	0
C1046	0		0	0	0	0	0	0	0	0	0	0
C1075	0		0	0	0	0	0	0	0	0	0	0
C1076	0		0	0	0	0	0	0	0	0	0	0
C11	0		0	0	0	0	0	0	0	0	0	0
C1106	0		0	0	0	0	0	0	0	0	0	0
C111	0		0	0	0	0	0	0	0	0	0	0
C1146	0		0	0	0	0	0	0	0	0	0	0
C1192	0		0	0	0	0	0	0	0	0	0	0
C12	0		0	0	0	0	0	0	0	0	0	0
C1202	0		0	0	0	0	0	0	0	0	0	0
C13	0		0	0	0	0	0	0	0	0	0	0
C16	0		0	0	0	0	0	0	0	0	0	0
C17	0		0	0	0	0	0	0	0	0	0	0
C18	0		0	0	0	0	0	0	0	0	0	0
C2	0		0	0	0	0	0	0	0	0	0	0
C2192	0		0	0	0	0	0	0	0	0	0	0

Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C2193	0		0	0	0	0	0	0	0	0	0	0
C2201	0		0	0	0	0	0	0	0	0	0	0
C2215	0		0	0	0	0	0	0	0	0	0	0
C2268	0		0	0	0	0	0	0	0	0	0	0
C2302	0		0	0	0	0	0	0	0	0	0	0
C2325	0		0	0	0	0	0	0	0	0	0	0
C2386	0		0	0	0	0	0	0	0	0	0	0
C2406	0		0	0	0	0	0	0	0	0	0	0
C27	0		0	0	0	0	0	0	0	0	0	0
C3	0		0	0	0	0	0	0	0	0	0	0
C31	0		0	0	0	0	0	0	0	0	0	0
C32	0		0	0	0	0	0	0	0	0	0	0
C33	0		0	0	0	0	0	0	0	0	0	0
C34	0		0	0	0	0	0	0	0	0	0	0
C37	0		0	0	0	0	0	0	0	0	0	0
C38	0		0	0	0	0	0	0	0	0	0	0
C39	0		0	0	0	0	0	0	0	0	0	0
C4	0		0	0	0	0	0	0	0	0	0	0
C40	0		0	0	0	0	0	0	0	0	0	0
C41	0		0	0	0	0	0	0	0	0	0	0
C42	0		0	0	0	0	0	0	0	0	0	0
C43	0		0	0	0	0	0	0	0	0	0	0
C44	0		0	0	0	0	0	0	0	0	0	0
C45	0		0	0	0	0	0	0	0	0	0	0
C46	0		0	0	0	0	0	0	0	0	0	0
C464	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C47	0		0	0	0	0	0	0	0	0	0	0
C472	0		0	0	0	0	0	0	0	0	0	0
C48	0		0	0	0	0	0	0	0	0	0	0
C49	0		0	0	0	0	0	0	0	0	0	0
C5	0		0	0	0	0	0	0	0	0	0	0
C50	0		0	0	0	0	0	0	0	0	0	0
C51	0		0	0	0	0	0	0	0	0	0	0
C512	0		0	0	0	0	0	0	0	0	0	0
C52	0		0	0	0	0	0	0	0	0	0	0
C53	0		0	0	0	0	0	0	0	0	0	0
C54	0		0	0	0	0	0	0	0	0	0	0
C5450	0		0	0	0	0	0	0	0	0	0	0
C5451	0		0	0	0	0	0	0	0	0	0	0
C5452	0		0	0	0	0	0	0	0	0	0	0
C5453	0		0	0	0	0	0	0	0	0	0	0
C5454	0		0	0	0	0	0	0	0	0	0	0
C5455	0		0	0	0	0	0	0	0	0	0	0
C547	0		0	0	0	0	0	0	0	0	0	0
C55	0		0	0	0	0	0	0	0	0	0	0
C56	0		0	0	0	0	0	0	0	0	0	0
C57	0		0	0	0	0	0	0	0	0	0	0
C58	0		0	0	0	0	0	0	0	0	0	0
C59	0		0	0	0	0	0	0	0	0	0	0
C60	0		0	0	0	0	0	0	0	0	0	0
C605	0		0	0	0	0	0	0	0	0	0	0
C607	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C61	0		0	0	0	0	0	0	0	0	0	0
C62	0		0	0	0	0	0	0	0	0	0	0
C6389	0		0	0	0	0	0	0	0	0	0	0
C64	0		0	0	0	0	0	0	0	0	0	0
C65	0		0	0	0	0	0	0	0	0	0	0
C650	0		0	0	0	0	0	0	0	0	0	0
C66	0		0	0	0	0	0	0	0	0	0	0
C67	0		0	0	0	0	0	0	0	0	0	0
C68	0		0	0	0	0	0	0	0	0	0	0
C6814	0		0	0	0	0	0	0	0	0	0	0
C6815	0		0	0	0	0	0	0	0	0	0	0
C6816	0		0	0	0	0	0	0	0	0	0	0
C69	0		0	0	0	0	0	0	0	0	0	0
C70	0		0	0	0	0	0	0	0	0	0	0
C71	0		0	0	0	0	0	0	0	0	0	0
C7140	0		0	0	0	0	0	0	0	0	0	0
C7141	0		0	0	0	0	0	0	0	0	0	0
C7142	0		0	0	0	0	0	0	0	0	0	0
C7143	0		0	0	0	0	0	0	0	0	0	0
C7144	0		0	0	0	0	0	0	0	0	0	0
C7145	0		0	0	0	0	0	0	0	0	0	0
C7146	0		0	0	0	0	0	0	0	0	0	0
C7147	0		0	0	0	0	0	0	0	0	0	0
C72	0		0	0	0	0	0	0	0	0	0	0
C73	0		0	0	0	0	0	0	0	0	0	0
C74	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C75	0		0	0	0	0	0	0	0	0	0	0
C76	0		0	0	0	0	0	0	0	0	0	0
C77	0		0	0	0	0	0	0	0	0	0	0
C78	0		0	0	0	0	0	0	0	0	0	0
C79	0		0	0	0	0	0	0	0	0	0	0
C80	0		0	0	0	0	0	0	0	0	0	0
C81	0		0	0	0	0	0	0	0	0	0	0
C82	0		0	0	0	0	0	0	0	0	0	0
C83	0		0	0	0	0	0	0	0	0	0	0
C9	0		0	0	0	0	0	0	0	0	0	0

Table 5F: Conduits

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C1	80.286	0	1
C10	63.364	0	1
C1046	14.82	0	1
C1075	8.808	0	1
C1076	11.283	0	1
C11	8.687	0	1
C1106	13.528	0	1
C111	80.426	0	1
C1146	16.208	0	1
C1192	11.719	0	1

Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C12	14.69	0	1
C1202	7.334	0	1
C13	7.798	0	1
C16	34.026	0	1
C17	42.866	0	1
C18	160.147	0	1
C2	143.639	0	1
C2192	14.435	0	1
C2193	11.775	0	1
C2201	10.526	0	1
C2215	11.168	0	1
C2268	13.21	0	1
C2302	15.72	0	1
C2325	10.634	0	1
C2386	9.908	0	1
C2406	15.24	0	1
C27	5.088	0	1
C3	75.585	0	1
C31	14.395	0	1
C32	19.183	0	1
C33	26.965	0	1
C34	13.641	0	1
C37	4.651	0	1
C38	6.346	0	1
C39	16.539	0	1
C4	36.353	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C40	7.713	0	1
C41	7.051	0	1
C42	11.966	0	1
C43	12.41	0	1
C44	8.317	0	1
C45	37.311	0	1
C46	25.797	0	1
C464	15.06	0	1
C47	4.255	0	1
C472	15.24	0	1
C48	16.408	0	1
C49	64.613	0	1
C5	13.308	0	1
C50	67.039	0	1
C51	35.426	0	1
C512	15.241	0	1
C52	131.742	0	1
C53	40.957	0	1
C54	14.707	0	1
C5450	25.532	0	1
C5451	56.57	0	1
C5452	3.894	0	1
C5453	6.125	0	1
C5454	57.954	0	1
C5455	34.898	0	1
C547	11.883	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C55	6.283	0	1
C56	6.024	0	1
C57	18.673	0	1
C58	38.297	0	1
C59	10.812	0	1
C60	37.396	0	1
C605	15.431	0	1
C607	16.55	0	1
C61	21.536	0	1
C62	20.62	0	1
C6389	0.268	0	1
C64	21.578	0	1
C65	20.515	0	1
C650	8.842	0	1
C66	23.027	0	1
C67	19.796	0	1
C68	23.439	0	1
C6814	91.879	0	1
C6815	51.67	0	1
C6816	8.85	0	1
C69	16.096	0	1
C70	23.672	0	1
C71	21.106	0	1
C7140	0.285	0	1
C7141	0.095	0	1
C7142	0.134	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C7143	0.164	0	1
C7144	0.095	0	1
C7145	0.095	0	1
C7146	0.164	0	1
C7147	93.011	0	1
C72	22.939	0	1
C73	16.198	0	1
C74	22.898	0	1
C75	18.316	0	1
C76	21.39	0	1
C77	22.684	0	1
C78	16.12	0	1
C79	15.484	0	1
C80	25.75	0	1
C81	122.49	0	1
C82	34.523	0	1
C83	6.549	0	1
C9	20.69	0	1

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Table 6A: ARM Subcatchments

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)
S1	1010487.317	2847818.725			SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB2	0.913	300	3.519	0
S10	1005708.415	2844682.934	Set		SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J20	0.352	300	8.406	0
S103_1	1007362.004	2845719.622	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J25	0.781	300	11.045	0
S103_2	1007058.318	2845579.838	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J1	0.636	300	14.154	0
S106	1011862.971	2845745.351	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH13	0.436	300	5.668	0
S11	1011368.787	2845042.386	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB30	0.24	300	11.124	0
S112	1011765.715	2845607.459	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH12	0.576	300	11.629	0
S117	1006645.061	2845292.582	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J8	1.279	300	7.392	0
S119	1011710.229	2845450.521	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB32	0.487	300	13.311	0
S12	1009155.269	2846806.185	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J28	1.163	300	11.343	0
S121	1006652.612	2845362.099	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J4	0.365	300	7.731	0
S122	1011582.402	2845423.142	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH11	0.033	300	5.762	0
S123_1	1011641.466	2845102.141	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB33	5.513	300	8.307	0
S126	1006771.027	2845326.81	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J7	0.373	300	8.112	0
S128_1	1011314.008	2844967.879	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB29	0.912	300	6.141	0
S128_3	1011439.667	2845206.557	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB27	0.082	300	5.357	0
S128_4	1011509.295	2845310.923	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	cb28	0.069	300	3.231	0
S13	1010995.082	2845155.655			SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J417	9.522	300	9.391	0
S130	1006150.145	2845207.413	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J5	1.595	300	27.808	0
S135	1006040.366	2844957.721	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J13	0.89	300	15.026	0
S135_2	1005799.316	2844651.484	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J12	0.528	300	15.451	0
S135_4	1005715.768	2844640.674	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J12	0.218	300	10.886	0
S138	1006093.058	2844885.605	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J11	0.718	300	12.176	0
S14	1010073.132	2846967.657			SCS Dimensionless UH	10yr24yr_NOAA_4.6in	OF-RS-13-S	8.285	300	10.506	0
S141	1011205.465	2844879.436	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH15	0.124	300	4.749	0
S2	1010278.468	2848203.067		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	DuckPond	26.281	300	10.923	0

Table 6A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)
S2_1	1010537.761	2846249.488		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CourtStWetlandArea	0.379	300	16.627	0
S2_3	1010958.977	2846249.347		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J1134	10.8	300	12.201	0
S23	1009578.801	2847171.57	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB36	0.524	300	10.193	0
S25	1010728.262	2847636.033		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH4	2.032	300	5.744	0
S26	1010339.144	2847226.967		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J110	0.546	300	3.813	0
S26_1	1010334.853	2847481.827		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH5	0.38	300	6.003	0
S26_2	1010265.57	2847510.507		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J30	2.305	300	6.225	0
S28	1010126.571	2847580.706		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J31	9.662	300	8.684	0
S30	1011355.912	2847415.335		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB104	4.405	300	11.115	0
S32	1010496.691	2847333.793		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB6	2.021	300	6.639	0
S33	1010881.808	2847329.337		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J611	8.854	300	10.761	0
S36	1011722.209	2847132.617		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB105	12.204	300	9.923	0
S46_2	1009603.012	2847123.201	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB37	0.538	300	4.62	0
S49_1	1010739.79	2846918.195		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J893	3.133	300	10.21	0
S49_2	1010372.03	2846602.463		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J975	1.131	300	12.177	0
S49_3	1010535.049	2846799.21		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J908	0.276	300	4.194	0
S49_4	1010640.175	2846724.247		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J935	2.232	300	9.012	0
S49_5	1010446.731	2846786.408		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J915	0.082	300	4.497	0
S49_6	1010444.732	2846453.095		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J1024	0.451	300	8.23	0
S49_8	1010511.018	2846349.272		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J189	0.18	300	4.348	0
S5	1011269.647	2845445.835		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	WinthropPond	1.084	300	5.645	0
S52_2	1009925.542	2847338.791	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J30	0.249	300	3.955	0
S53	1011172.364	2846593.041		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J121	3.103	300	17.273	0
S6	1005494.968	2844432.915	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J22	0.279	300	8.507	0
S6_1	1008971.765	2846458.918	Set		SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J6	1.238	300	9.56	0
S6_3	1009439.368	2846742.738	Set		SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J27	4.78	300	12.857	0

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Table 6A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)	Imperv. (%)
S6_4	1009688.465	2847016.819	Set		SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB38	1.549	300	10.774	0
S7	1011037.519	2844670.263	Set		SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH17	0.125	300	9.11	0
S70_2	1010722.908	2845836.1		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J335	2.87	300	7.148	0
S75_2	1008589.068	2846300.144	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J6	1.627	300	11.794	0
S76_1	1011305.239	2845685.652		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J1353	5.302	300	12.888	0
S8	1005452.29	2844454.885			SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J18	0.372	300	7.857	0
S80_1	1010894.296	2845731.405		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB23	0.578	300	4.766	0
S9	1011213.411	2844798.075	Set		SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH16	0.38	300	3.94	0
S90_1	1008157.655	2846015.314	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J17	0.138	300	5.266	0
S90_2	1008454.394	2846213.676	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J10	0.441	300	10.746	0
S97_2	1007093.128	2845499.64	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J3	0.299	300	6.44	0
S99_2	1007877.635	2845863.999	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J15	0.25	300	2.582	0
R1_1	-7814364.971	5169049.977	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J31	0.487	300	6.426	0
R3_1	-7813934.519	5168322.624		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB34	0.308	300	4.658	0
R3_3	-7813905.512	5168324.095		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	CB24	0.039	300	4.658	0
R3_4	-7813890.128	5168347.762		WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	WinthropPond	0.788	300	4.66	0
S98_3	-7813503.99	5168429.516	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	MH14	0.201	300	13.371	0
R4_1	-7815245.33	5168440.929	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J26	2.024	300	10.977	0
R4_2	-7815172.403	5168526.52	Set	WDT	SCS Dimensionless UH	10yr24yr_NOAA_4.6in	OF-RS-9-N	0.479	300	10.988	0
R5	-7814662.994	5168936.48	Set		SCS Dimensionless UH	10yr24yr_NOAA_4.6in	J29	1.586	300	10.734	0

Table 6B: ARM Subcatchments

Name	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method	IA Method
S1	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.002	SCS CN	0.2 S
S10	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S103_1	0.05	11.618	3	0.5	4	7	0	1.93	4.739	0.413	User entered value	5	SCS CN	0.2 S
S103_2	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S106	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.041	SCS CN	0.2 S
S11	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S112	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S117	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.198	SCS CN	0.2 S
S119	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S12	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	6.7	SCS CN	0.2 S
S121	0.05	11.504	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S122	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S123_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S126	0.05	11.514	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.008	SCS CN	0.2 S
S128_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN	0.2 S
S128_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S128_4	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S13	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	10.3	SCS CN	0.2 S
S130	0.05	12.119	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.3	SCS CN	0.2 S
S135	0.05	11.577	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S135_2	0.05	11.529	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S135_4	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S138	0.05	11.53	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S14	0.05	12.22	3	0.5	4	7	0	1.982	4.347	0.41	User entered value	6.698	SCS CN	0.2 S
S141	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN	0.2 S
S2	0.05	12.46	3	0.5	4	7	0	2.868	2.723	0.397	User entered value	12.8	SCS CN	0.2 S

Table 6B: ARM Subcatchments (continued...)

Name	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method	IA Method
S2_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S2_3	0.05	11.581	3	0.5	4	7	0	2.396	1.208	0.39	User entered value	9.5	SCS CN	0.2 S
S23	0.05	11.5	3	0.5	4	7	0	1.932	4.728	0.413	User entered value	5	SCS CN	0.2 S
S25	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	13.9	SCS CN	0.2 S
S26	0.05	12.536	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S26_1	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S26_2	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.199	SCS CN	0.2 S
S28	0.05	11.835	3	0.5	4	7	0	2.257	4.036	0.407	User entered value	7.722	SCS CN	0.2 S
S30	0.05	11.99	3	0.5	4	7	0	2.008	4.151	0.409	User entered value	7.3	SCS CN	0.2 S
S32	0.05	11.5	3	0.5	4	7	0	1.944	4.631	0.412	User entered value	5.9	SCS CN	0.2 S
S33	0.05	11.93	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	15.1	SCS CN	0.2 S
S36	0.05	11.541	3	0.5	4	7	0	2.24	2.389	0.398	User entered value	24.9	SCS CN	0.2 S
S46_2	0.05	11.513	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S49_1	0.05	11.624	3	0.5	4	7	0	2.124	3.271	0.404	User entered value	17.8	SCS CN	0.2 S
S49_2	0.05	11.5	3	0.5	4	7	0	2.088	3.546	0.405	User entered value	5	SCS CN	0.2 S
S49_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S49_4	0.05	11.543	3	0.5	4	7	0	2.261	2.229	0.397	User entered value	5	SCS CN	0.2 S
S49_5	0.05	11.716	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S49_6	0.05	11.5	3	0.5	4	7	0	2.264	2.207	0.397	User entered value	5	SCS CN	0.2 S
S49_8	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S5	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S52_2	0.05	11.5	3	0.5	4	7	0	2.199	2.7	0.4	User entered value	5.001	SCS CN	0.2 S
S53	0.05	11.5	3	0.5	4	7	0	2.161	2.99	0.402	User entered value	5	SCS CN	0.2 S
S6	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S6_1	0.05	12.367	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.2	SCS CN	0.2 S
S6_3	0.05	12.239	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S

Table 6B: ARM Subcatchments (continued...)

Name	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method	IA Method
S6_4	0.05	11.509	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S7	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S70_2	0.05	11.504	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S75_2	0.05	12.11	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	8.2	SCS CN	0.2 S
S76_1	0.05	11.623	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	7.6	SCS CN	0.2 S
S8	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S80_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S9	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
S90_1	0.05	12.035	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S90_2	0.05	11.63	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S97_2	0.05	11.726	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
S99_2	0.05	11.942	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.244	SCS CN	0.2 S
R1_1	0.05	11.5	3	0.5	4	7	0	2.111	3.37	0.404	User entered value	5	SCS CN	0.2 S
R3_1	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
R3_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
R3_4	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN	0.2 S
S98_3	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN	0.2 S
R4_1	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	27.172	SCS CN	0.2 S
R4_2	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN	0.2 S
R5	0.05	12.229	3	0.5	4	7	0	2.154	3.045	0.402	User entered value	5	SCS CN	0.2 S

Table 6C: ARM Subcatchments

Name	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)	Roughness
S1	0.411	82.955	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S10	0.143	93.311	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S103_1	0.982	67.075	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S103_2	1.108	64.358	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S106	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S11	0.053	97.442	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S112	0.172	92.078	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S117	0.764	72.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S119	0.263	88.363	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S12	1.666	54.548	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S121	0.482	80.59	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S122	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S123_1	0.167	92.274	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S126	0.422	82.568	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S128_1	0.069	96.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S128_3	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S128_4	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S13	0.807	71.254	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S130	2.219	47.407	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S135	0.47	80.956	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S135_2	0.633	75.95	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S135_4	0.076	96.35	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S138	0.501	79.966	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S14	0.677	74.72	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S141	0.159	92.649	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S2	1.7	54.06	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1

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Table 6C: ARM Subcatchments (continued...)

Name	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)	Roughness
S2_1	1.622	55.211	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S2_3	0.628	76.097	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S23	1.119	64.122	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S25	0.429	82.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S26	0.139	93.496	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S26_1	0.496	80.121	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S26_2	0.432	82.234	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S28	0.881	69.412	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S30	1.372	59.304	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S32	0.51	79.692	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S33	0.979	67.134	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S36	1.122	64.068	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S46_2	2.758	42.031	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_1	0.278	87.78	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_2	0.44	81.972	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_3	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_4	0.294	87.166	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_5	0.045	97.821	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_6	0.25	88.899	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S49_8	0.121	94.296	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S5	0.412	82.903	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S52_2	0.193	91.184	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S53	0.547	78.512	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S6	0.309	86.616	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S6_1	2.363	45.842	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S6_3	1.641	54.929	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1

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Table 6C: ARM Subcatchments (continued...)

Name	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)	Roughness
S6_4	1.218	62.146	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S7	0.043	97.919	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S70_2	0.469	81.003	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S75_2	1	66.673	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S76_1	0.82	70.914	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S8	0.327	85.953	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S80_1	0.163	92.473	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S9	0.048	97.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S90_1	0.19	91.328	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S90_2	0.651	75.453	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S97_2	0.511	79.665	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S99_2	0.117	94.48	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R1_1	0.812	71.117	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R3_1	0.272	88.01	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R3_3	0.158	92.689	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R3_4	0.578	77.569	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
S98_3	0.214	90.344	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R4_1	0.717	73.607	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R4_2	3.561	35.962	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1
R5	0.651	75.452	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0	0.1

Table 6D: ARM Subcatchments

Name	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)	Runoff Coefficient
S1	2017			No	0	0	0	0	4.596	1.789	2.833	0.07	2.546	0.617
S10	2017			No	0	0	0	0	4.596	0.761	3.871	0.037	1.257	0.842
S103_1	2017			No	0	0	0	0	4.596	3.063	1.547	0.033	1.148	0.337
S103_2	2017			No	0	0	0	0	4.596	3.248	1.361	0.024	0.8	0.296
S106	2017			No	0	0	0	0	4.596	0.236	4.402	0.052	1.647	0.958
S11	2017			No	0	0	0	0	4.596	0.301	4.335	0.028	0.903	0.943
S112	2017			No	0	0	0	0	4.596	0.892	3.738	0.058	2.013	0.813
S117	2017			No	0	0	0	0	4.596	2.677	1.918	0.067	2.106	0.417
S119	2017			No	0	0	0	0	4.596	1.273	3.354	0.044	1.572	0.73
S12	2017			No	0	0	0	0	4.596	3.834	0.778	0.025	0.628	0.169
S121	2017			No	0	0	0	0	4.596	2.001	2.62	0.026	0.945	0.57
S122	2017			No	0	0	0	0	4.596	0.236	4.401	0.004	0.125	0.958
S123_1	2017			No	0	0	0	0	4.596	0.872	3.76	0.563	19.336	0.818
S126	2017			No	0	0	0	0	4.596	1.824	2.798	0.028	1.028	0.609
S128_1	2017			No	0	0	0	0	4.596	0.391	4.244	0.105	3.408	0.923
S128_3	2017			No	0	0	0	0	4.596	0.236	4.401	0.01	0.31	0.958
S128_4	2017			No	0	0	0	0	4.596	0.236	4.4	0.008	0.261	0.957
S13	2017			No	0	0	0	0	4.596	2.761	1.82	0.471	14.769	0.396
S130	2017			No	0	0	0	0	4.596	4.177	0.422	0.018	0.303	0.092
S135	2017			No	0	0	0	0	4.596	1.969	2.652	0.064	2.331	0.577
S135_2	2017			No	0	0	0	0	4.596	2.393	2.224	0.032	1.159	0.484
S135_4	2017			No	0	0	0	0	4.596	0.425	4.21	0.025	0.812	0.916
S138	2017			No	0	0	0	0	4.596	2.055	2.564	0.05	1.821	0.558
S14	2017			No	0	0	0	0	4.596	2.492	2.149	0.483	16.652	0.467
S141	2017			No	0	0	0	0	4.596	0.832	3.799	0.013	0.438	0.827
S2	2017			No	0	0	0	0	4.596	3.86	0.732	0.522	11.786	0.159

Table 6D: ARM Subcatchments (continued...)

Name	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)	Runoff Coefficient
S2_1	2017			No	0	0	0	0	4.596	3.798	0.805	0.008	0.225	0.175
S2_3	2017			No	0	0	0	0	4.596	2.381	2.208	0.648	20.57	0.48
S23	2017			No	0	0	0	0	4.596	3.263	1.345	0.019	0.65	0.293
S25	2017			No	0	0	0	0	4.596	1.844	2.741	0.151	4.603	0.596
S26	2017			No	0	0	0	0	4.596	0.741	3.891	0.058	1.956	0.847
S26_1	2017			No	0	0	0	0	4.596	2.042	2.578	0.027	0.969	0.561
S26_2	2017			No	0	0	0	0	4.596	1.855	2.74	0.172	5.499	0.596
S28	2017			No	0	0	0	0	4.596	2.897	1.742	0.457	14.72	0.379
S30	2017			No	0	0	0	0	4.596	3.566	1.056	0.126	3.619	0.23
S32	2017			No	0	0	0	0	4.596	2.079	2.535	0.139	4.954	0.552
S33	2017			No	0	0	0	0	4.596	3.059	1.525	0.367	10.147	0.332
S36	2017			No	0	0	0	0	4.596	3.267	1.329	0.44	10.397	0.289
S46_2	2017			No	0	0	0	0	4.596	4.38	0.218	0.003	0.028	0.047
S49_1	2017			No	0	0	0	0	4.596	1.331	3.266	0.278	7.626	0.711
S49_2	2017			No	0	0	0	0	4.596	1.878	2.743	0.084	3.06	0.597
S49_3	2017			No	0	0	0	0	4.596	0.236	4.401	0.033	1.043	0.957
S49_4	2017			No	0	0	0	0	4.596	1.391	3.235	0.196	6.995	0.704
S49_5	2017			No	0	0	0	0	4.596	0.257	4.381	0.01	0.309	0.953
S49_6	2017			No	0	0	0	0	4.596	1.22	3.408	0.042	1.474	0.742
S49_8	2017			No	0	0	0	0	4.596	0.654	3.979	0.019	0.653	0.866
S5	2017			No	0	0	0	0	4.596	1.794	2.828	0.083	3.018	0.615
S52_2	2017			No	0	0	0	0	4.596	0.986	3.644	0.025	0.855	0.793
S53	2017			No	0	0	0	0	4.596	2.18	2.439	0.205	7.484	0.531
S6	2017			No	0	0	0	0	4.596	1.445	3.181	0.024	0.862	0.692
S6_1	2017			No	0	0	0	0	4.596	4.241	0.358	0.012	0.178	0.078
S6_3	2017			No	0	0	0	0	4.596	3.814	0.79	0.102	2.749	0.172

Table 6D: ARM Subcatchments (continued...)

Name	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)	Runoff Coefficient
S6_4	2017			No	0	0	0	0	4.596	3.391	1.216	0.051	1.69	0.265
S7	2017			No	0	0	0	0	4.596	0.246	4.392	0.015	0.472	0.956
S70_2	2017			No	0	0	0	0	4.596	1.964	2.657	0.207	7.53	0.578
S75_2	2017			No	0	0	0	0	4.596	3.091	1.526	0.067	2.084	0.332
S76_1	2017			No	0	0	0	0	4.596	2.786	1.855	0.267	8.742	0.404
S8	2017			No	0	0	0	0	4.596	1.509	3.116	0.031	1.13	0.678
S80_1	2017			No	0	0	0	0	4.596	0.85	3.781	0.059	2.035	0.823
S9	2017			No	0	0	0	0	4.596	0.276	4.36	0.045	1.432	0.949
S90_1	2017			No	0	0	0	0	4.596	0.971	3.659	0.014	0.475	0.796
S90_2	2017			No	0	0	0	0	4.596	2.434	2.183	0.026	0.95	0.475
S97_2	2017			No	0	0	0	0	4.596	2.082	2.538	0.021	0.75	0.552
S99_2	2017			No	0	0	0	0	4.596	0.634	3.993	0.027	0.904	0.869
R1_1	2017			No	0	0	0	0	4.596	2.771	1.842	0.024	0.873	0.401
R3_1	2017			No	0	0	0	0	4.596	1.308	3.318	0.028	0.986	0.722
R3_3	2017			No	0	0	0	0	4.596	0.827	3.804	0.004	0.138	0.828
R3_4	2017			No	0	0	0	0	4.596	2.26	2.358	0.05	1.838	0.513
S98_3	2017			No	0	0	0	0	4.596	1.073	3.556	0.019	0.678	0.774
R4_1	2017			No	0	0	0	0	4.596	2.58	2.016	0.111	2.709	0.439
R4_2	2017			No	0	0	0	0	4.596	4.539	0.057	0.001	0.003	0.012
R5	2017			No	0	0	0	0	4.596	2.434	2.183	0.094	3.415	0.475

Table 6E: ARM Subcatchments

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S1	315.069	3688.787	1
S10	269.666	1423.459	1
S103_1	377.028	3159.303	1
S103_2	295.706	2574.745	1
S106	233.481	1631.88	1
S11	168.535	969.45	1
S112	307.634	2332.704	1
S117	712.861	5180.467	1
S119	179.431	1969.813	1
S12	494.459	4707.633	1
S121	270.8	1476.259	1
S122	59.644	132.225	1
S123_1	668.642	22309.393	1
S126	304.22	1500.539	1
S128_1	362.657	3683.22	1
S128_3	88.73	333.025	1
S128_4	131.285	280.734	1
S13	895.981	38534.838	1
S130	622.887	6453.473	1
S135	370.13	3603.291	1
S135_2	315.527	2135.183	1
S135_4	194.92	883.385	1
S138	345.481	2904.866	1
S14	796.88	33566.433	1
S141	100.226	495.075	1
S2	1627.441	106358.672	1

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Table 6E: ARM Subcatchments (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S2_1	157.843	1534.804	1
S2_3	1284.924	43708.974	1
S23	289.85	2122.072	1
S25	572.013	8217.123	1
S26	226.137	2209.877	1
S26_1	210.057	1536.428	1
S26_2	644.649	9327.342	1
S28	336.748	3040.206	1
S30	617.351	17821.744	1
S32	756.561	8203.518	1
S33	1019.231	35810.985	1
S36	1284.844	49364.997	1
S46_2	317.357	1711.653	1
S49_1	824.311	12680.818	1
S49_2	327.795	4577.905	1
S49_3	134.11	1118.726	1
S49_4	636.595	9031.481	1
S49_5	88.964	331.036	1
S49_6	195.824	1823.61	1
S49_8	121.828	726.955	1
S5	548.842	4387.004	1
S52_2	208.657	1007.1	1
S53	693.413	12557.385	1
S6	201.685	1127.756	1
S6_1	349.322	5010.388	1
S6_3	667.94	19372.264	1

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Table 6E: ARM Subcatchments (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S6_4	354.418	6315.075	1
S7	129.15	502.961	1
S70_2	717.708	11615.95	1
S75_2	1002.106	6583.03	1
S76_1	859.132	21455.902	1
S8	242.966	1506.778	1
S80_1	242.097	2340.437	1
S9	211.337	1535.98	1
S90_1	153.485	557.903	1
S90_2	338.375	1784.976	1
S97_2	294.868	1210.755	1
S99_2	267.109	928.72	1
R1_1	234.206	1969.851	1
R3_1	147.113	1245.434	1
R3_3	49.68	159.372	1
R3_4	353.112	3185.744	1
S98_3	178.953	814.244	1
R4_1	785.818	8199.973	1
R4_2	257.642	1939.276	1
R5	347.858	6416.274	1

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PCSWMM Report

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Existing

Model ShankPainter_EX_100yr24hr_2024.03.21.inp

Apex Companies, LLC

March 30, 2024

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Summary 1: Options

Name	ShankPainter_EX_100yr24hr_2024.03.21
Flow Units	CFS
Infiltration method	Curve Number
Flow routing method	Dynamic Wave
Link offsets defined by	Depth
Allow ponding	No
Skip steady flow periods	No
Inertial dampening	Full
Define supercritical flow by	Both
Force Main Equation	H-W
Variable time step	On
Adjustment factor (%)	75
Conduit lengthening (s)	0
Minimum surface area (ft²)	0.1
Starting date	Oct-31-2018 12:00:00 AM
Ending date	Nov-2-2018 12:00:00 AM
Duration of simulation (hours)	48
Antecedent dry days (days)	0
Rain interval (h:mm)	0:06
Report time step (h:mm:ss)	00:01:00
Wet time step (h:mm:ss)	00:05:00
Dry time step (h:mm:ss)	00:05:00
Routing time step (s)	0.5
Minimum time step used (s)	0.1
Average time step used (s)	0.5
Minimum conduit slope	0
Ignore rainfall/runoff	No
Ignore snow melt	No
Ignore groundwater	No
Ignore flow routing	No
Ignore water quality	No
Report average results	No

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Summary 2: Model inventory

Name	ShankPainter_EX_100yr24hr_2024.03.21
Raingages	3
Subcatchments	0
Aquifers	0
Snowpacks	0
RDII hydrographs	0
Junction nodes	1946
Outfall nodes	349
Flow divider nodes	0
Storage unit nodes	12
Conduit links	5466
Pump links	0
Orifice links	40
Weir links	0
Outlet links	0
Treatment units	0
Transects	1
Control rules	0
Pollutants	0
Land Uses	0
Control Curves	0
Diversion Curves	0
Pump Curves	0
Rating Curves	0
Shape Curves	0
Storage Curves	12
Tidal Curves	0
Weir Curves	0
Time Series	4
Time Patterns	0

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Summary 3: Model complexity

Name	ShankPainter_EX_100yr24hr_2024.03.21
Subcatchments	n/a
Groundwater	n/a
Aquifers	n/a
Snowpacks	n/a
RDII hydrographs	n/a
Junction nodes	3963
Outfall nodes	349
Flow divider nodes	n/a
Storage unit nodes	36
Conduit links	32691
Pump links	n/a
Orifice links	160
Weir links	n/a
Outlet links	n/a
Transect	3
Pollutants	n/a
Land Uses	n/a
Model complexity (total uncertain input parameters)	37202

Summary 4: Node statistics

Name	ShankPainter_EX_100yr24hr_2024.03.21
Max. ground elev. (ft)	81.527
Min. ground elev. (ft)	4.5
Max. invert elev. (ft)	52.558
Min. invert elev. (ft)	1.5
Max. depth (ft)	30
Min. depth (ft)	0

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Summary 5: Conduit statistics

Name	ShankPainter_EX_100yr24hr_2024.03.21
Max. roughness	0.4
Min. roughness	0.01
Max. entry loss coef.	0.5
Min. entry loss coef.	0
Max. exit loss coef.	0
Min. exit loss coef.	0
Max. avg. loss coef.	0.5
Min. avg. loss coef.	0
Max. length (ft)	525.428
Min. length (ft)	5.84
Total length (ft)	129787.795
Max. slope (ft/ft)	2.0301
Min. slope (ft/ft)	-0.6074

Summary 6: Conduit Inventory

Name	ShankPainter_EX_100yr24hr_2024.03.21
Open Rectangular (ft)	122599.077
Circular (ft)	7188.718

Summary 7: Pipe inventory

Name	ShankPainter_EX_100yr24hr_2024.03.21
Max. pipe diameter (ft)	1.5
Min. pipe diameter (ft)	0.833
Total 12” pipe length (ft)	6004.031
Total 15” pipe length (ft)	304.631
Total 18” pipe length (ft)	668.046
Total other pipe length (ft)	212.01
Total pipe length (ft)	7188.718

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Summary 8: Flow routing continuity

Name	ShankPainter_EX_100yr24hr_2024.03.21
Dry weather inflow (MG)	0.000
Wet weather inflow (MG)	0.000
Groundwater inflow (MG)	0.000
RDII inflow (MG)	0.000
External inflow (MG)	15.147
External outflow (MG)	6.109
Flooding loss (MG)	4.303
Evaporation loss (MG)	0.000
Exfiltration loss (MG)	0.000
Initial stored volume (MG)	0.002
Final stored volume (MG)	4.737
Continuity error (%)	0.003

Summary 9: Results statistics

Name	ShankPainter_EX_100yr24hr_2024.03.21
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	40.18
Num. nodes surcharged	18
Max. node surcharge duration (hours)	2.44
Max. node height above crown (ft)	39.176
Min. node depth below rim (ft)	-1.84
Num. nodes flooded	6
Max. node flooding duration (hours)	37.88
Max. node flood volume (MG)	2.064
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	30
Max. storage volume (1000 ft³)	353.682
Max. storage percent full (%)	100
Max. outfall flow frequency (%)	82.01
Max. outfall peak flow (cfs)	41.14
Max. outfall total volume (MG)	1.856
Total outfall volume (MG)	11.141
Max. link peak flow (cfs)	50.65
Max. link peak velocity (ft/s)	19.97
Min. link peak velocity (ft/s)	0

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Summary 9: Results statistics (continued...)

Name	ShankPainter_EX_100yr24hr_2024.03.21
Num. conduits surcharged	60
Max. conduit surcharge duration (hours)	46.11
Max. conduit capacity limited duration (hours)	4.57

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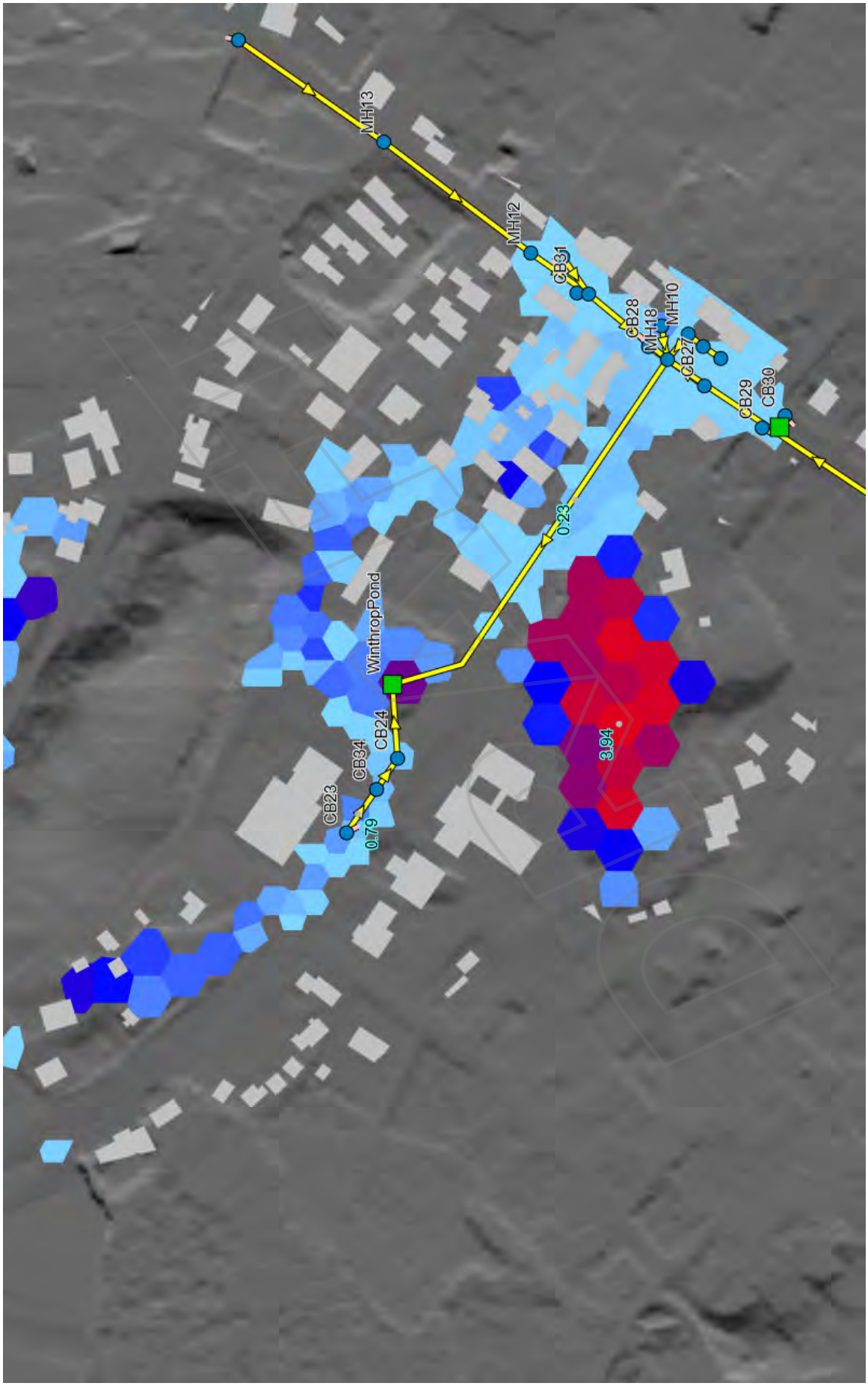


Figure 1: South Shank Painter

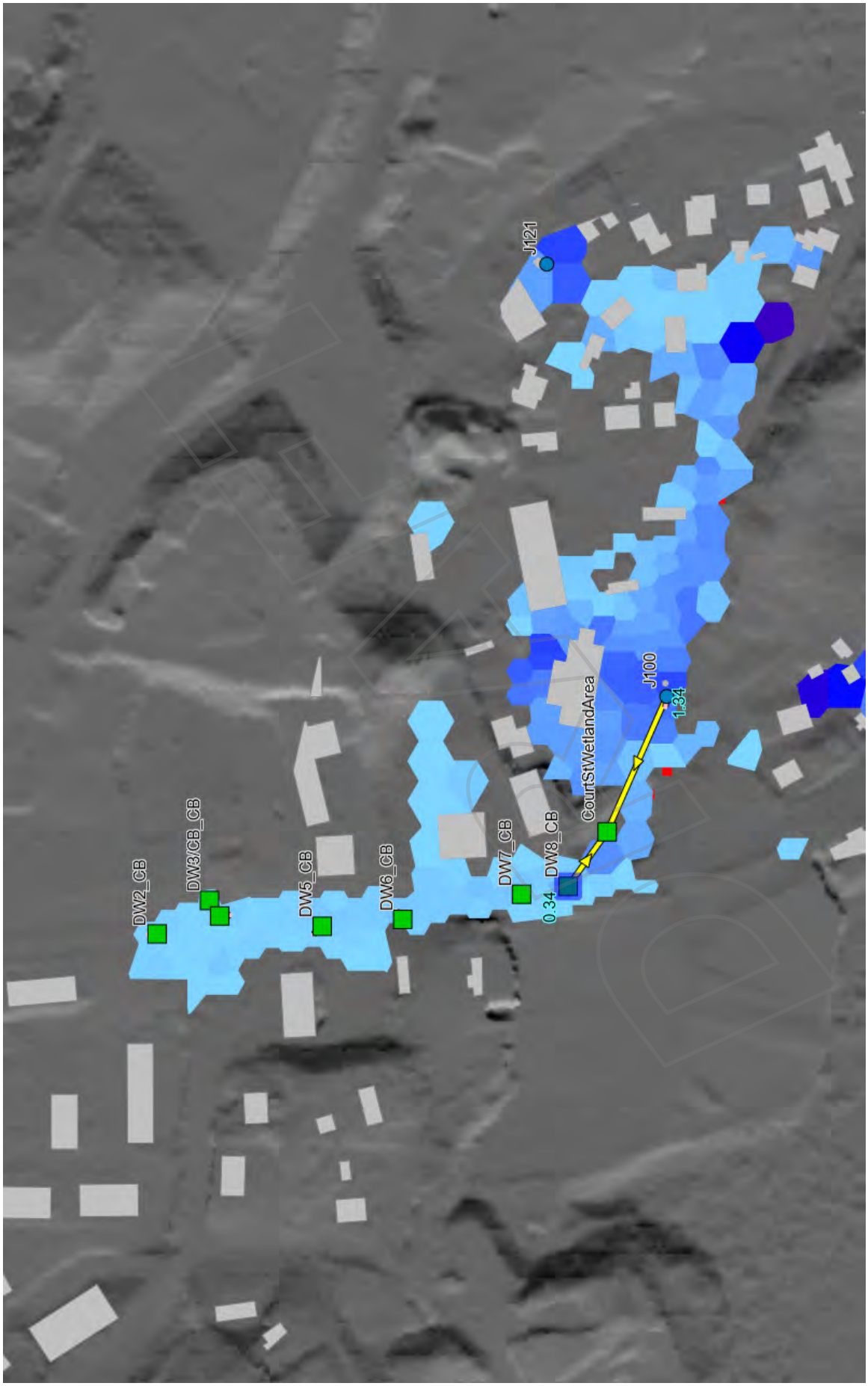


Figure 2: Court Street

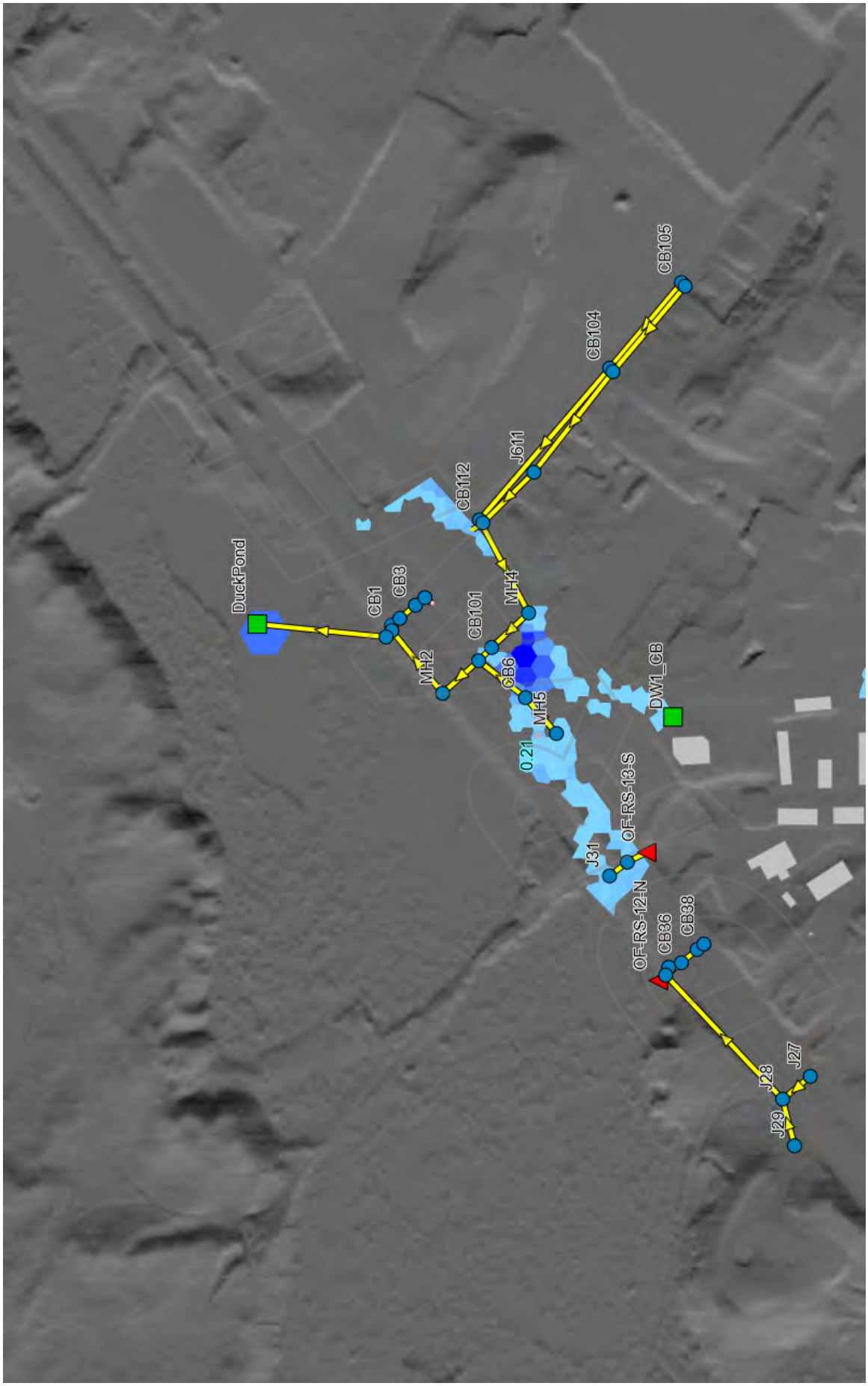


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

Table 1A: Storages

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Evap. Factor (fraction)
CourtStWetlandArea	1010557.027	2846257.418	Zone4	NO	NO	3	6	3	0	0	0	0
DuckPond	1010546.204	2848276.651	DirectConnection	NO	NO	4	5	1	0	0	0	0
DW#9	1011400.39	2845161.145		NO	NO	8.15	15.65	7.5	0	0	0	0
DW1	1010327.064	2847296.604		NO	NO	13.7	23.25	9.55	0	0	0	0
DW2	1010428.943	2846822.099		NO	NO	15.18	23.18	8	0	0	0	0
DW3/CB	1010470.911	2846756.334		NO	NO	14.05	21.85	7.8	0	0	0	0
DW4/CB	1010451.455	2846743.609		NO	NO	14.66	21.16	6.5	0	0	0	0
DW5	1010438.474	2846614.939		NO	NO	11.35	19.35	8	0	0	0	0
DW6	1010447.126	2846514.015		NO	NO	9.72	17.61	7.89	0	0	0	0
DW7	1010478.707	2846364.865		NO	NO	7.79	15.68	7.89	0	0	0	0
DW8	1010488.609	2846306.387		NO	NO	6.56	14.06	7.5	0	0	0	0
WinthropPond	1011093.123	2845623.4	Zone6	NO	NO	1.5	4.5	3	0	0	0	0

Table 1B: Storages

Name	Storage Curve	Coefficient	Exponent	Constant (ft²)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series	Scale Factor
CourtStWetlandArea	TABULAR	1000	0	0	CourtStWetlandArea	0	0	0	0	0			1
DuckPond	TABULAR	1000	0	0	DuckPond5ft	0	0	0	0	0			1
DW#9	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW1	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW2	TABULAR	1000	0	0	Drywell_#2	0	0	0	0	0			1
DW3/CB	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW4/CB	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0			1
DW5	TABULAR	1000	0	0	Drywell_#5	0	0	0	0	0			1

Table 1B: Storages (continued...)

Name	Storage Curve	Coefficient	Exponent	Constant (ft^2)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series	Scale Factor
DW6	TABULAR	1000	0	0	Drywell_#6	0	0	0	0	0			1
DW7	TABULAR	1000	0	0	Drywell_#7	0	0	0	0	0			1
DW8	TABULAR	1000	0	0	Drywell_#8	0	0	0	0	0			1
WinthropPond	TABULAR	1000	0	0	WinthropPond	0	0	0	0	0			1

Table 1C: Storages

Name	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (fraction)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
CourtStWetlandArea	0						0	0	0	0	1.91	3	6
DuckPond	0						0	0	0	0	0.69	0.98	4.98
DW#9	0						0	0	0	0	6.31	7.18	15.33
DW1	0						0	0	0	0	7.37	9.36	23.06
DW2	0						0	0	0	0	5.93	7.8	22.98
DW3/CB	0						0	0	0	0	6.06	7.8	21.85
DW4/CB	0						0	0	0	0	5.35	6.17	20.83
DW5	0						0	0	0	0	4.69	6.46	17.81
DW6	0						0	0	0	0	5.99	7.66	17.38
DW7	0						0	0	0	0	5.66	7.17	14.96
DW8	0						0	0	0	0	5.36	6.82	13.38
WinthropPond	0						0	0	0	0	2.44	3	4.5

Table 1D: Storages

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
CourtStWetlandArea	10/31/2018 11:49 AM	3	0.74	24.4	0.022	0.884	0.048	0	0	2.06	1.57	21.74	0.365
DuckPond	11/02/2018 00:00 AM	0.98	39.94	49.47	1.41	2.65	0.004	0	0	0.52	0	0	0
DW#9	10/31/2018 12:05 PM	7.17	0	1.37	0	0.046	1.23	0	0	0.32	0	0	0
DW1	10/31/2018 12:06 PM	9.36	0	0.19	0	0.003	8.484	0	0	0.19	0	0	0
DW2	10/31/2018 13:32 PM	7.8	0	0.47	0	0.014	1.618	0	0	0.2	0	0	0
DW3/CB	10/31/2018 13:52 PM	7.8	0	0.08	0	0.004	6.25	0	0	0	10.87	0.01	0.001
DW4/CB	10/31/2018 12:10 PM	6.17	0	0.03	0	0.002	9.735	0	0	0.33	0	0	0
DW5	11/01/2018 23:59 PM	6.46	0	0.37	0	0.014	1.452	0	0	1.54	0	0	0
DW6	10/31/2018 12:08 PM	7.66	0	0.42	0	0.014	1.578	0	0	0.23	0	0	0
DW7	10/31/2018 12:08 PM	7.17	0	0.22	0	0.012	1.797	0	0	0.72	0	0	0
DW8	10/31/2018 12:06 PM	6.82	0	0.09	0	0.005	3.76	0	0	0.68	0	0	0
WinthropPond	10/31/2018 11:10 AM	3	8.61	61.54	0.241	2.36	0.31	0	0	0	36.82	61.54	2.064

Table 1E: Storages

Name	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
CourtStWetlandArea	0	7.585	58	0	0	0	12.972	100	2.66	0	0	0
DuckPond	0	244.384	66	0	0	0	353.682	96	0	0	0	0
DW#9	0	0.251	83	0	0	0	0.288	95	1.37	0	0	0
DW1	0	0.298	77	0	0	0	0.381	98	0	0	0	0
DW2	0	1.366	74	0	0	0	1.804	97	0	0	0	0
DW3/CB	0	0.242	77	0	0	0	0.314	100	0	0	0	0
DW4/CB	0	0.211	81	0	0	0	0.245	95	0	0	0	0
DW5	0	1.256	58	0	0	0	1.74	80	0	0	0	0

Table 1E: Storages (continued...)

Name	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
DW6	0	1.418	76	0	0	0	1.821	97	0.01	0	0	0
DW7	0	1.19	71	0	0	0	1.516	90	0.02	0	0	0
DW8	0	0.527	71	0	0	0	0.676	90	0.02	0	0	0
WinthropPond	0	30.843	81	0	0	0	38	100	0	0	0	0

Table 1F: Storages

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CourtStWetlandArea	0	0	1
DuckPond	0	0	1
DW#9	0	0	1
DW1	0	0	1
DW2	0	0	1
DW3/CB	0	0	1
DW4/CB	0	0	1
DW5	0	0	1
DW6	0	0	1
DW7	0	0	1
DW8	0	0	1
WinthropPond	0	0	1

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Table 2A: Junctions

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
CB1	1010543.4	2847960.354	Connect2D_orifices	NO	NO	5.58	11.33	5.75	0	30	0	0	
CB101	1010490.895	2847724.25	Connect2D	NO	NO	6.58	12.18	5.6	0	30	0	0	
CB104	1011149.472	2847446.085		NO	NO	11.53	15.969	4.439	0	50	0	0	
CB105	1011351.247	2847276.782		NO	NO	17.62	19.674	2.054	0	50	0	0	
CB112	1010791.703	2847752.789		NO	NO	8.98	12.818	3.838	0	50	0	0	
CB2	1010559.723	2847940.655	Connect2D_orifices	NO	NO	6.08	11.13	5.05	0	30	0	0	
CB23	1010916.007	2845678.085	Connect2D_orifices	NO	NO	3.84	6.04	2.2	0	30	0	0	
CB24	1011004.87	2845617.259	Connect2D_orifices	NO	NO	3.09	5.99	2.9	0	30	0	0	
CB27	1011449.616	2845250.949	Connect2D_orifices	NO	NO	8	10.039	2.039	0	30	0	0	
CB28	1011496.541	2845317.631	Connect2D_orifices	NO	NO	5.5	9.25	3.75	0	30	0	0	
CB29	1011399.511	2845181.95	Connect2D_orifices	NO	NO	11.88	14.18	2.3	0	30	0	0	
CB3	1010590.535	2847903.6	Connect2D_orifices	NO	NO	6.13	11.23	5.1	0	30	0	0	
CB30	1011414.192	2845154.644	Connect2D_orifices	NO	NO	12.37	15.17	2.8	0	30	0	0	
CB31	1011560.681	2845403.096	Connect2D_orifices	NO	NO	8.85	11.7	2.85	0	30	0	0	
CB32	1011603.491	2845420.161	Connect2D_orifices	NO	NO	8.21	10.91	2.7	0	30	0	0	
CB33	1011521.313	2845302.115	Connect2D_orifices	NO	NO	5.55	9.05	3.5	0	30	0	0	
CB34	1010967.796	2845642.325	Connect2D_orifices	NO	NO	3.16	6.06	2.9	0	30	0	0	
CB35	1009736.842	2847306.934		NO	NO	6.76	12.09	5.33	0	30	0	0	
CB36	1009747.672	2847276.924		NO	NO	6.99	12.09	5.1	0	30	0	0	
CB37	1009778.85	2847240.103		NO	NO	7.23	12.04	4.81	0	30	0	0	
CB38	1009791.611	2847223.915		NO	NO	7.85	12.04	4.19	0	30	0	0	
CB4	1010608.483	2847881.463	Connect2D_orifices	NO	NO	6.36	11.16	4.8	0	30	0	0	
CB6	1010372.626	2847644.457	Connect2D_orifices	NO	NO	7.08	11.13	4.05	0	30	0	0	
DW1_CB	1010326.268	2847296.606	Connect2D_orifices	NO	NO	15.7	23.017	7.317	0	30	0	0	
DW2_CB	1010428.791	2846823.007	Connect2D_orifices	NO	NO	17.18	22.856	5.676	0	30	0	0	
DW3/CB_CB	1010471.232	2846756.294	Connect2D_orifices	NO	NO	16.05	21.742	5.692	0	30	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
DW4/CB_CB	1010450.889	2846743.592	Connect2D_orifices	NO	NO	16.66	20.744	4.084	0	30	0	0	
DW5_CB	1010438.501	2846615.469	Connect2D_orifices	NO	NO	13.35	18.726	5.376	0	30	0	0	
DW6_CB	1010446.739	2846514.06	Connect2D_orifices	NO	NO	11.72	17.223	5.503	0	30	0	0	
DW7_CB	1010478.491	2846364.887	Connect2D_orifices	NO	NO	9.79	14.78	4.99	0	30	0	0	
DW8_CB	1010488.932	2846306.194	Connect2D_orifices	NO	NO	8.56	13.472	4.912	0	30	0	0	
J1	1006841.74	2845465.493		NO	NO	27.4	32.9	5.5	0	50	0	0	
J10	1008672.424	2846345.08		NO	NO	31	36.6	5.6	0	50	0	0	
J100	1010726.938	2846182.757		NO	NO	3.31	5.26	1.95	0	0	0	0	
J1048	1010488.392	2846314.248	2D_label	NO	NO	13.649	43.649	30	0	0	0	0	
J11	1005923.53	2844777.21		NO	NO	21	26.115	5.115	0	50	0	0	
J1134	1010743.392	2846184.348	2D_label	NO	NO	5.012	35.012	30	0	0	0	0	
J12	1005617.671	2844526.538		NO	NO	16.5	21.2	4.7	0	50	0	0	
J121	1011269.487	2846333.216	DirectConnection	NO	NO	7.185	7.185	0	0	30	0	0	
J13	1005898.8	2844802.636		NO	NO	20.7	25.178	4.478	0	50	0	0	
J1391	1010938.392	2845664.748	2D_label	NO	NO	5.561	35.561	30	0	0	0	0	
J14	1007660.717	2845841.779		NO	NO	33	38.2	5.2	0	50	0	0	
J15	1007693.105	2845773.999		NO	NO	33.2	38.2	5	0	50	0	0	
J1563	1011313.392	2845404.948	2D_label	NO	NO	7.865	37.865	30	0	0	0	0	
J16	1008017.631	2846022.698		NO	NO	35	40.6	5.6	0	50	0	0	
J17	1008052.712	2845956.117		NO	NO	35.6	40.617	5.017	0	50	0	0	
J18	1005326.069	2844318.463		NO	NO	13.74	17.97	4.23	0	50	0	0	
J2	1009033.294	2846722.781		NO	NO	21.4	27.8	6.4	0	30	0	0	
J20	1005571.622	2844576.409		NO	NO	16	21.2	5.2	0	50	0	0	
J22	1005435.367	2844345.713		NO	NO	14.5	19	4.5	0	50	0	0	
J23	1005396.081	2844465.056		NO	NO	8	13.349	5.349	0	50	0	0	
J25	1007203.876	2845643.62		NO	NO	30.5	35.3	4.8	0	50	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
J26	1007233.433	2845579.973		NO	NO	30.1	35.3	5.2	0	50	0	0	
J27	1009479.713	2846973.226		NO	NO	14.15	19.01	4.86	0	30	0	0	
J28	1009425.906	2847038.355		NO	NO	13.18	18.8	5.62	0	30	0	0	
J29	1009316.153	2847010.384		NO	NO	13.55	21.71	8.16	0	50	0	0	
J3	1006870.603	2845395.681		NO	NO	27.7	32.743	5.043	0	50	0	0	
J30	1009984.72	2847404.505	Connect2D_orifices	NO	NO	4.8	9.3	4.5	0	30	0	0	
J31	1009952.378	2847446.349	Connect2D_orifices	NO	NO	5.1	9.4	4.3	0	30	0	0	
J32	1009718.364	2847313.955		NO	NO	5.5	9.8	4.3	0	50	0	0	
J4	1006494.893	2845267.078		NO	NO	25.7	30.676	4.976	0	50	0	0	
J417	1011045.896	2845352.789	2D_label	NO	NO	2.588	32.588	30	0	0	0	0	
J445	1011141.216	2847438.472		NO	NO	15.852	15.852	0	0	0	0	0	
J5	1006199.682	2845072.656		NO	NO	23.5	28.576	5.076	0	50	0	0	
J564	1010784.775	2847744.961		NO	NO	12.788	12.788	0	0	0	0	0	
J6	1009085.26	2846666.103		NO	NO	22	27.428	5.428	0	30	0	0	
J611	1010904.043	2847624.504		NO	NO	13.624	13.624	0	0	0	0	0	
J66	1011342.74	2847268.156		NO	NO	19.557	19.557	0	0	0	0	0	
J7	1006533.642	2845207.831		NO	NO	24	30.512	6.512	0	50	0	0	
J739	1010284.392	2847613.248	2D_label	NO	NO	11.057	41.057	30	0	0	0	0	
J8	1006239.797	2845014.495		NO	NO	22.8	28.379	5.579	0	50	0	0	
J9	1008626.945	2846408.03		NO	NO	32	36.8	4.8	0	50	0	0	
MH1	1010530.644	2847959.58	Connect2D_MH	NO	NO	4.73	10.954	6.224	0	30	0	0	
MH10	1011511.543	2845270.131		NO	NO	8.24	10.04	1.8	0	50	0	0	
MH11	1011559.458	2845389.196		NO	NO	8	11.188	3.188	0	50	0	0	
MH12	1011608.36	2845458.27	Connect2D_orifices	NO	NO	12	15.157	3.157	0	30	0	0	
MH13	1011741.006	2845633.705	Connect2D_orifices	NO	NO	24	28.74	4.74	0	30	0	0	
MH14	1011862.65	2845807.307	Connect2D_orifices	NO	NO	31	35.203	4.203	0	30	0	0	

Table 2A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)	Baseline Pattern
MH15	1011240.734	2844935.933	Connect2D_orifices	NO	NO	25	30.512	5.512	0	30	0	0	
MH16	1011171.126	2844842.863	Connect2D_orifices	NO	NO	25.5	30.676	5.176	0	30	0	0	
MH17	1011090.371	2844735.468	Connect2D_orifices	NO	NO	28.44	32.448	4.008	0	30	0	0	
MH18	1011481.215	2845295.06		NO	NO	5.62	8.957	3.337	0	50	0	0	
MH2	1010382.993	2847839.795	Connect2D	NO	NO	5.58	11.867	6.287	0	30	0	0	
MH3	1010459.751	2847754.847	Connect2D	NO	NO	6.08	12.069	5.989	0	30	0	0	
MH4	1010572.351	2847637.139	Connect2D	NO	NO	7.83	12.009	4.179	0	30	0	0	
MH5	1010288.201	2847571.427	Connect2D_orifices	NO	NO	7.45	11.5	4.05	0	30	0	0	
MH8	1011482.438	2845231.488		NO	NO	8.21	10.51	2.3	0	50	0	0	
MH9	1011496.673	2845252.412		NO	NO	8.1	10.1	2	0	50	0	0	
OF-SP-1-WJ	1010515.721	2847973.034	Zone2	NO	NO	4.67	4.67	0	0	0	0	0	

Table 2B: Junctions

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
CB1		1	0						0	0.08	2.34	7.92	10/31/2018 12:05 PM	2.33
CB101		1	0						0	0.37	4.53	11.11	10/31/2018 12:06 PM	4.53
CB104		1	0						0	0.51	5.14	16.67	10/31/2018 12:10 PM	5.14
CB105		1	0						0	0.2	3.09	20.71	10/31/2018 12:20 PM	3.09
CB112		1	0						0	0.44	4.34	13.32	10/31/2018 12:14 PM	4.34
CB2		1	0						0	0.07	2.51	8.59	10/31/2018 12:05 PM	2.5
CB23		1	0						0	0.57	2.61	6.45	10/31/2018 12:04 PM	2.6
CB24		1	0						0	1.13	2.52	5.61	10/31/2018 12:05 PM	2.52
CB27		1	0						0	0.03	1.41	9.41	10/31/2018 12:05 PM	1.41

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
CB28		1	0						0	0.31	3.87	9.37	10/31/2018 12:05 PM	3.87
CB29		1	0						0	2.75	3.39	15.27	10/31/2018 12:05 PM	3.39
CB3		1	0						0	0.05	2.47	8.6	10/31/2018 12:05 PM	2.45
CB30		1	0						0	2.3	3	15.37	10/31/2018 12:05 PM	3
CB31		1	0						0	0.03	3.12	11.97	10/31/2018 12:05 PM	3.12
CB32		1	0						0	0.1	4.52	12.73	10/31/2018 12:05 PM	4.52
CB33		1	0						0	0.38	5.14	10.69	10/31/2018 12:05 PM	5.14
CB34		1	0						0	1.1	2.98	6.14	10/31/2018 12:05 PM	2.98
CB35		1	0						0	0.06	6.67	13.43	10/31/2018 12:05 PM	6.67
CB36		1	0						0	0.1	8.48	15.47	10/31/2018 12:05 PM	8.47
CB37		1	0						0	0.12	9.39	16.62	10/31/2018 12:05 PM	9.39
CB38		1	0						0	0.1	9.33	17.18	10/31/2018 12:05 PM	9.32
CB4		1	0						0	0.02	2.24	8.6	10/31/2018 12:05 PM	2.22
CB6		1	0						0	0.27	4.59	11.67	10/31/2018 12:18 PM	4.59
DW1_CB		1	0						0	5.63	7.36	23.06	10/31/2018 12:06 PM	7.36
DW2_CB		1	0						0	4.31	5.8	22.98	10/31/2018 13:32 PM	5.8
DW3/CB_CB		1	0						0	4.34	5.8	21.85	11/01/2018 13:49 PM	5.8
DW4/CB_CB		1	0						0	3.48	4.17	20.83	10/31/2018 12:10 PM	4.17
DW5_CB		1	0						0	3.12	4.46	17.81	11/01/2018 23:10 PM	4.46
DW6_CB		1	0						0	4.29	5.66	17.38	10/31/2018 12:08 PM	5.66
DW7_CB		1	0						0	3.95	5.17	14.96	10/31/2018 12:08 PM	5.17
DW8_CB		1	0						0	3.61	4.82	13.38	10/31/2018 12:06 PM	4.82
J1		1	0						0	0.04	0.6	28	10/31/2018 12:05 PM	0.6
J10		1	0						0	0.02	0.29	31.29	10/31/2018 12:05 PM	0.29
J100		1	0						0	1.57	1.95	5.26	10/31/2018 10:07 AM	1.95
J1048		1	0						0	0.02	0.34	13.99	10/31/2018 12:05 PM	0.34

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
J11		1	0						0	0.05	1.19	22.19	10/31/2018 12:05 PM	1.19
J1134		1	0						0	0.38	1.34	6.35	10/31/2018 12:24 PM	1.34
J12		1	0						0	0.06	1.12	17.62	10/31/2018 12:05 PM	1.11
J121		1	0						0	0.48	0.78	7.96	10/31/2018 12:05 PM	0.78
J13		1	0						0	0.07	1.02	21.72	10/31/2018 12:05 PM	1.01
J1391		1	0						0	0.45	0.79	6.35	10/31/2018 12:16 PM	0.79
J14		1	0						0	0.03	0.31	33.31	10/31/2018 12:05 PM	0.31
J15		1	0						0	0.06	0.6	33.8	10/31/2018 12:05 PM	0.6
J1563		1	0						0	0.01	0.23	8.1	10/31/2018 12:05 PM	0.23
J16		1	0						0	0.02	0.24	35.24	10/31/2018 12:05 PM	0.24
J17		1	0						0	0.03	0.36	35.96	10/31/2018 12:05 PM	0.36
J18		1	0						0	0.03	0.41	14.15	10/31/2018 12:05 PM	0.41
J2		1	0						0	0.05	0.75	22.15	10/31/2018 12:05 PM	0.75
J20		1	0						0	0.05	0.69	16.69	10/31/2018 12:05 PM	0.69
J22		1	0						0	0.02	0.29	14.79	10/31/2018 12:05 PM	0.29
J23		1	0						0	0.06	1.38	9.38	10/31/2018 12:05 PM	1.37
J25		1	0						0	0.05	0.82	31.32	10/31/2018 12:05 PM	0.82
J26		1	0						0	0.06	0.73	30.83	10/31/2018 12:15 PM	0.73
J27		1	0						0	0.45	34.86	49.01	10/31/2018 11:56 AM	34.86
J28		1	0						0	0.47	35.62	48.8	10/31/2018 12:03 PM	35.62
J29		1	0						0	0.49	40.18	53.73	10/31/2018 12:05 PM	40.18
J3		1	0						0	0.04	0.62	28.32	10/31/2018 12:05 PM	0.62
J30		1	0						0	0.28	4.92	9.72	10/31/2018 12:05 PM	4.92
J31		1	0						0	0.31	6.14	11.24	10/31/2018 12:05 PM	6.13
J32		1	0						0	0.16	7.93	13.43	10/31/2018 12:05 PM	7.93
J4		1	0						0	0.03	0.42	26.12	10/31/2018 12:05 PM	0.42

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
J417		1	0						0	2.88	3.94	6.53	11/01/2018 23:59 PM	3.94
J445		1	0						0	0.01	0.29	16.14	10/31/2018 12:16 PM	0.29
J5		1	0						0	0.04	0.55	24.05	10/31/2018 12:05 PM	0.55
J564		1	0						0	0.02	0.42	13.2	10/31/2018 12:15 PM	0.41
J6		1	0						0	0.09	3.24	25.24	10/31/2018 12:05 PM	3.24
J611		1	0						0	0.02	0.46	14.08	10/31/2018 12:15 PM	0.46
J66		1	0						0	0	0.19	19.75	10/31/2018 12:20 PM	0.19
J7		1	0						0	0.03	0.34	24.34	10/31/2018 12:05 PM	0.34
J739		1	0						0	0.1	0.21	11.26	10/31/2018 12:31 PM	0.21
J8		1	0						0	0.04	0.49	23.29	10/31/2018 12:05 PM	0.49
J9		1	0						0	0	0	32	10/31/2018 00:00 AM	0
MH1		1	0						0	0.4	2.97	7.7	10/31/2018 12:05 PM	2.96
MH10		1	0						0	0.01	1.15	9.39	10/31/2018 12:05 PM	1.15
MH11		1	0						0	0.12	4.33	12.33	10/31/2018 12:05 PM	4.33
MH12		1	0						0	0.07	3.4	15.4	10/31/2018 12:05 PM	3.4
MH13		1	0						0	0.04	0.48	24.48	10/31/2018 12:05 PM	0.48
MH14		1	0						0	0.03	0.31	31.31	10/31/2018 12:05 PM	0.31
MH15		1	0						0	0.04	0.5	25.5	10/31/2018 12:05 PM	0.5
MH16		1	0						0	0.08	1.12	26.62	10/31/2018 12:05 PM	1.12
MH17		1	0						0	0.02	0.26	28.7	10/31/2018 12:05 PM	0.26
MH18		1	0						0	0.19	3.77	9.39	10/31/2018 12:05 PM	3.77
MH2		1	0						0	0.35	3.9	9.48	10/31/2018 12:05 PM	3.9
MH3		1	0						0	0.39	4.49	10.57	10/31/2018 12:06 PM	4.49
MH4		1	0						0	0.38	4.58	12.41	10/31/2018 12:10 PM	4.58
MH5		1	0						0	0.21	4.19	11.64	10/31/2018 12:18 PM	4.19
MH8		1	0						0	0.03	1.18	9.39	10/31/2018 12:05 PM	1.18

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Table 2B: Junctions (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
MH9		1	0						0	0.11	1.29	9.39	10/31/2018 12:05 PM	1.29
OF-SP-1-WJ		1	0						0	0.33	1.13	5.8	10/31/2018 12:05 PM	1.13

Table 2C: Junctions

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
CB1	0	4.35	0	0.124	0	0	0	3.41	0	0	0	0	0	0
CB101	0	3.8	0	0.811	0.001	0	0	1.07	0	0	0	0	0	0
CB104	9.87	13.63	0.303	0.918	-0.011	0	0	-0.701	0	0	0	0	0	0
CB105	24.47	24.47	0.975	0.975	0	0	0	-1.036	0	0	0	0	0	0
CB112	0	3.18	0	0.658	-0.003	0	0	-0.502	0	0	0	0	0	0
CB2	4.39	4.39	0.124	0.124	-0.001	0	0	2.54	0	0	0	0	0	0
CB23	3.18	3.18	0.095	0.255	0.051	0	0	-0.41	0	0	0	0	0	0
CB24	0.22	4.22	0.006	0.308	0.154	0	0	0.38	0	0	0	0	0	0
CB27	0.47	0.56	0.015	0.018	-0.005	0	0	0.629	0	0	0	0	0	0
CB28	0.39	1.12	0.013	0.014	0.036	0	0	-0.12	0	0	0	0	0	0
CB29	5.17	6.53	0.163	0.206	0.06	0	0	-1.09	0	0	0	0	0	0
CB3	0	0.08	0	0.001	0.012	0	0	2.63	0	0	0	0	0	0
CB30	1.37	1.37	0.044	0.044	0.182	0	0	-0.2	0	0	0	0	0	0
CB31	0	3.74	0	0.022	0.002	0	0	-0.27	0	0	0	0	0	0
CB32	2.55	2.57	0.074	0.074	0.001	0	0	-1.82	0	0	0	0	0	0
CB33	30.27	30.27	0.907	0.915	0.002	0	0	-1.64	0	0	0	0	0	0
CB34	1.61	4.14	0.046	0.3	0.132	0	0	-0.08	0	0	0	0	0	0
CB35	0	0.41	0	0	-2.569	0.59	5.673	0	0	0	0	0	0	0

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
CB36	1.53	6.04	0.042	0.173	-0.002	0.59	7.476	0	0	0	0	0	0	0
CB37	0.33	4.51	0.014	0.131	-0.002	0.58	8.394	0	0	0	0	0	0	0
CB38	4.19	4.19	0.117	0.117	-0.001	0.54	8.325	0	0	0	0	0	0	0
CB4	0	0.02	0	0	0.008	0	0	2.56	0	0	0	0	0	0
CB6	8.93	9.7	0.253	0.361	-0.001	0	0	-0.54	0	0	0	0	0	0
DW1_CB	0	0.2	0	0.003	5.742	0	0	-0.043	0	0	0	0	0	0
DW2_CB	0	0.47	0	0.014	1.09	0	0	-0.124	0	0	0	0	0	0
DW3/CB_CB	0	0.09	0	0.004	4.128	0	0	-0.108	0	0	0	0	0	0
DW4/CB_CB	0	0.03	0	0.002	5.427	0	0	-0.086	0	0	0	0	0	0
DW5_CB	0	0.37	0	0.014	0.909	0	0	0.916	0	0	0	0	0	0
DW6_CB	0	0.43	0	0.014	1.038	0	0	-0.157	0	0	0	0	0	0
DW7_CB	0	0.22	0	0.012	1.144	0	0	-0.18	0	0	0	0	0	0
DW8_CB	0	1.77	0	0.07	0.175	0	0	0.59	0	0	0	0	0	0
J1	1.87	3.21	0.052	0.089	0.002	0	0	4.9	0	0	0	0	0	0
J10	1.81	1.81	0.05	0.05	0	0	0	5.31	0	0	0	0	0	0
J100	0	23.24	0	1.86	0.044	0	0	0.117	37.88	23.24	1.832	0	0	0
J1048	0	19.29	0	0.631	0	0	0	29.659	0	0	0	0	0	0
J11	3.26	3.26	0.091	0.091	0	0.09	0.195	3.92	0	0	0	0	0	0
J1134	38.87	38.87	1.23	1.33	0	0	0	28.662	0	0	0	0	0	0
J12	3.43	3.43	0.099	0.099	0	0.04	0.115	3.585	0	0	0	0	0	0
J121	13.66	13.66	0.379	0.379	0.394	0	0	-0.775	0	0	0	0	0	0
J13	4.12	7.38	0.115	0.206	0	0	0	3.458	0	0	0	0	0	0
J1391	0	5.4	0	0.079	0	0	0	29.211	0	0	0	0	0	0
J14	0	1.39	0	0.043	0	0	0	4.89	0	0	0	0	0	0
J15	1.39	1.39	0.043	0.043	0	0	0	4.4	0	0	0	0	0	0
J1563	0	18.02	0	0.29	0	0	0	29.765	0	0	0	0	0	0

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
J16	0	0.75	0	0.022	0.001	0	0	5.36	0	0	0	0	0	0
J17	0.75	0.75	0.022	0.022	0	0	0	4.657	0	0	0	0	0	0
J18	1.88	1.88	0.054	0.054	0	0	0	3.82	0	0	0	0	0	0
J2	0	5.9	0	0.186	0	0	0	5.65	0	0	0	0	0	0
J20	1.95	5.38	0.059	0.158	0	0	0	4.51	0	0	0	0	0	0
J22	1.43	1.43	0.041	0.041	0.001	0	0	4.21	0	0	0	0	0	0
J23	0	6.78	0	0.199	0	0.11	0.376	3.973	0	0	0	0	0	0
J25	2.52	2.52	0.07	0.07	0	0	0	3.98	0	0	0	0	0	0
J26	5.34	6.67	0.216	0.285	0	0	0	4.47	0	0	0	0	0	0
J27	9.24	9.24	0.27	0.27	-0.002	0.7	33.86	0	0.37	7.71	0.041	30	0	0
J28	2.08	10.11	0.065	0.474	-0.008	0.73	34.62	0	0.05	0.46	0	30	0	0
J29	6.5	6.5	0.179	0.179	0.005	0.74	39.176	0	0	0	0	0	0	0
J3	1.35	1.35	0.038	0.038	-0.005	0	0	4.423	0	0	0	0	0	0
J30	11.04	16.01	0.344	0.974	0	0	0	-0.42	0	0	0	0	0	0
J31	33.25	33.25	0.986	0.986	0	0	0	-1.84	0	0	0	0	0	0
J32	0	15.69	0	0.647	-0.001	0.72	6.932	0	0	0	0	0	0	0
J4	1.68	1.68	0.047	0.047	0	0	0	4.556	0	0	0	0	0	0
J417	29.9	29.9	0.943	0.957	0	0	0	26.058	0	0	0	0	0	0
J445	0	28.33	0	0.634	0	0	0	0.212	0	0	0	0	0	0
J5	1.79	1.79	0.061	0.061	0.008	0	0	4.526	0	0	0	0	0	0
J564	0	50.66	0	1.44	-0.001	0	0	0.088	0	0	0	0	0	0
J6	5.9	5.9	0.186	0.186	0.001	0.4	2.238	2.19	0	0	0	0	0	0
J611	22.75	49.98	0.776	1.41	0.001	0	0	0.044	0	0	0	0	0	0
J66	0	20.42	0	0.361	0.001	0	0	0.307	0	0	0	0	0	0
J7	1.78	3.46	0.05	0.097	0	0	0	6.172	0	0	0	0	0	0
J739	0	2.07	0	0.013	0	0	0	29.797	0	0	0	0	0	0

Table 2C: Junctions (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
J8	4.21	6	0.132	0.193	-0.003	0	0	5.089	0	0	0	0	0	0
J9	0	0	0	0	0	0	0	4.8	0	0	0	0	0	0
MH1	0	10.15	0	1.24	0.032	2.44	1.715	3.259	0	0	0	0	0	0
MH10	0	0.19	0	0.001	-0.249	0.16	0.154	0.646	0	0	0	0	0	0
MH11	0.19	8.6	0.006	0.285	0.003	0.62	3.326	0	0	0	0	0	0	0
MH12	3.16	6.7	0.094	0.206	-0.008	0	0	-0.243	0	0	0	0	0	0
MH13	2.49	3.56	0.08	0.112	-0.002	0	0	4.26	0	0	0	0	0	0
MH14	1.08	1.08	0.032	0.032	0.005	0	0	3.893	0	0	0	0	0	0
MH15	0.68	3.46	0.02	0.112	-0.005	0	0	5.012	0	0	0	0	0	0
MH16	2.17	2.88	0.069	0.092	0	0	0	4.056	0	0	0	0	0	0
MH17	0.71	0.71	0.023	0.023	-0.002	0	0	3.748	0	0	0	0	0	0
MH18	0	13.9	0	1.07	-0.014	0.8	2.274	0	0	0	0	0	0	0
MH2	0	6.49	0	1.12	-0.001	0	0	2.387	0	0	0	0	0	0
MH3	0	6.54	0	1.12	-0.002	0	0	1.499	0	0	0	0	0	0
MH4	8.05	9.99	0.268	0.897	0	0	0	-0.401	0	0	0	0	0	0
MH5	1.73	1.73	0.048	0.051	-0.005	0	0	-0.14	0	0	0	0	0	0
MH8	0	0.07	0	0	1.738	0.16	0.185	1.115	0	0	0	0	0	0
MH9	0	0.13	0	0	3.97	0.18	0.294	0.706	0	0	0	0	0	0
OF-SP-1-WJ	0	10.15	0	1.24	-0.019	0	0	0.37	0	0	0	0	0	0

Table 2D: Junctions

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CB1	0	0	0	1
CB101	0	0	0	1
CB104	0	0	0	1
CB105	0	0	0	1
CB112	0	0	0	1
CB2	0	0	0	1
CB23	0	0	0	1
CB24	0	0	0	1
CB27	0	0	0	1
CB28	0	0	0	1
CB29	0	0	0	1
CB3	0	0	0	1
CB30	0	0	0	1
CB31	0	0	0	1
CB32	0	0	0	1
CB33	0	0	0	1
CB34	0	0	0	1
CB35	0	0	0	1
CB36	0	0	0	1
CB37	0	0	0	1
CB38	0	0	0	1
CB4	0	0	0	1
CB6	0	0	0	1
DW1_CB	0	0	0	1
DW2_CB	0	0	0	1
DW3/CB_CB	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
DW4/CB_CB	0	0	0	1
DW5_CB	0	0	0	1
DW6_CB	0	0	0	1
DW7_CB	0	0	0	1
DW8_CB	0	0	0	1
J1	0	0	0	1
J10	0	0	0	1
J100	0	0	0	1
J1048	0	0	0	1
J11	0	0	0	1
J1134	0	0	0	1
J12	0	0	0	1
J121	0	0	0	1
J13	0	0	0	1
J1391	0	0	0	1
J14	0	0	0	1
J15	0	0	0	1
J1563	0	0	0	1
J16	0	0	0	1
J17	0	0	0	1
J18	0	0	0	1
J2	0	0	0	1
J20	0	0	0	1
J22	0	0	0	1
J23	0	0	0	1
J25	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J26	0	0	0	1
J27	0	0	0	1
J28	0	0	0	1
J29	0	0	0	1
J3	0	0	0	1
J30	0	0	0	1
J31	0	0	0	1
J32	0	0	0	1
J4	0	0	0	1
J417	0	0	0	1
J445	0	0	0	1
J5	0	0	0	1
J564	0	0	0	1
J6	0	0	0	1
J611	0	0	0	1
J66	0	0	0	1
J7	0	0	0	1
J739	0	0	0	1
J8	0	0	0	1
J9	0	0	0	1
MH1	0	0	0	1
MH10	0	0	0	1
MH11	0	0	0	1
MH12	0	0	0	1
MH13	0	0	0	1
MH14	0	0	0	1

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Table 2D: Junctions (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
MH15	0	0	0	1
MH16	0	0	0	1
MH17	0	0	0	1
MH18	0	0	0	1
MH2	0	0	0	1
MH3	0	0	0	1
MH4	0	0	0	1
MH5	0	0	0	1
MH8	0	0	0	1
MH9	0	0	0	1
OF-SP-1-WJ	0	0	0	1

Table 3A: Orifices

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)
OR103	CB105	J66		BOTTOM	RECT_CLOSED	2	2	2.054	0.65	NO	0	NO	20.42	10/31/2018 12:20 PM
OR104	CB104	J445		BOTTOM	RECT_CLOSED	2	2	4.439	0.65	NO	0	NO	10.82	10/31/2018 12:05 PM
OR105	CB112	J564		BOTTOM	RECT_CLOSED	2	2	3.838	0.65	NO	0	NO	0.8	10/31/2018 12:06 PM
OR35	J100	J1133		BOTTOM	RECT_CLOSED	2	2	2.067	0.65	NO	0	NO	20.58	10/31/2018 12:24 PM

LEVEL

Table 3B: Orifices

Name	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OR103	0	0	0	0	3.694	0	1
OR104	0	0	0	0	3.422	0	1
OR105	0	0	0	0	3.186	0	1
OR35	0	0	0	0	4.158	0	1

Table 4A: Outfalls

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Tide Gate	Route To	Type	Fixed Stage (ft)	Curve Name	Series Name	Outlet	Baseline (cfs)	Baseline Pattern
OF-RS-10-S	1008709.714	2846286.735	Zone1	NO	NO	23.64	26.1	NO		FREE	0	*	*		0	
OF-RS-11-N	1008997.279	2846761.397	Zone1	NO	NO	18.64	21.1	NO		FREE	0	*	*		0	
OF-RS-12-N	1009705.646	2847331.275	Zone1	NO	NO	4.5	7.3	NO		FREE	0	*	*		0	
OF-RS-13-S	1010007.673	2847359.187	Zone1	NO	NO	4.12	8.86	NO		FREE	0	*	*		0	
OF-RS-1-N	1005291.471	2844369.017		NO	NO	12.17	12.17	NO		FREE	0	*	*		0	
OF-RS-2-N	1005381.777	2844473.665		NO	NO	7.26	7.26	NO		FREE	0	*	*		0	
OF-RS-3-N	1005823.967	2844899.856		NO	NO	19.37	19.37	NO		FREE	0	*	*		0	
OF-RS-4-S	1006279.282	2844959.564		NO	NO	11.15	11.15	NO		FREE	0	*	*		0	
OF-RS-5-S	1006567.492	2845149.66		NO	NO	10.22	10.22	NO		FREE	0	*	*		0	
OF-RS-6-N	1006807.849	2845520.893	Zone1	NO	NO	25.67	25.67	NO		FREE	0	*	*		0	
OF-RS-7-S	1007261.284	2845510.96	Zone1	NO	NO	25.15	25.15	NO		FREE	0	*	*		0	
OF-RS-8-N	1007630.539	2845893.742	Zone1	NO	NO	30.08	30.08	NO		FREE	0	*	*		0	
OF-RS-9-N	1007998.589	2846072.311	Zone1	NO	NO	33.13	33.13	NO		FREE	0	*	*		0	

Table 4B: Outfalls

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-10-S		1	0						0	0.02	0.28	23.92	10/31/2018 12:05 PM	0.28
OF-RS-11-N		1	0						0	0.04	0.66	19.3	10/31/2018 12:05 PM	0.66
OF-RS-12-N		1	0						0	0.09	1	5.5	10/31/2018 11:51 AM	1
OF-RS-13-S		1	0						0	0.17	1	5.12	10/31/2018 11:37 AM	1
OF-RS-1-N		1	0						0	0.03	0.38	12.55	10/31/2018 12:05 PM	0.38
OF-RS-2-N		1	0						0	0.06	0.8	8.06	10/31/2018 12:05 PM	0.8
OF-RS-3-N		1	0						0	0.06	0.95	20.32	10/31/2018 12:05 PM	0.95
OF-RS-4-S		1	0						0	0.03	0.46	11.61	10/31/2018 12:05 PM	0.46
OF-RS-5-S		1	0						0	0.02	0.32	10.54	10/31/2018 12:05 PM	0.32
OF-RS-6-N		1	0						0	0.04	0.56	26.23	10/31/2018 12:05 PM	0.55
OF-RS-7-S		1	0						0	0.05	0.66	25.81	10/31/2018 12:15 PM	0.66
OF-RS-8-N		1	0						0	0.03	0.3	30.38	10/31/2018 12:05 PM	0.29
OF-RS-9-N		1	0						0	0.02	0.23	33.36	10/31/2018 12:05 PM	0.23

Table 4C: Outfalls

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-10-S	0	1.81	0	0.05	0	0	0	0	0	0	0	0	34.91	0.11	1.81	0.05
OF-RS-11-N	0	5.89	0	0.186	0	0	0	0	0	0	0	0	31.81	0.46	5.89	0.186
OF-RS-12-N	0	15.69	0	0.647	0	0	0	0	0	0	0	0	35.58	1.43	15.69	0.647
OF-RS-13-S	32.32	41.14	0.929	1.86	0	0	0	0	0	0	0	0	44.36	3.28	41.14	1.856
OF-RS-1-N	0	1.88	0	0.054	0	0	0	0	0	0	0	0	40.62	0.1	1.88	0.054
OF-RS-2-N	0	6.78	0	0.199	0	0	0	0	0	0	0	0	47.6	0.33	6.78	0.199
OF-RS-3-N	0	7.37	0	0.206	0	0	0	0	0	0	0	0	38.12	0.42	7.37	0.206

Table 4C: Outfalls (continued...)

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-4-S	0	6	0	0.193	0	0	0	0	0	0	0	0	34.02	0.44	6	0.193
OF-RS-5-S	0	3.45	0	0.097	0	0	0	0	0	0	0	0	38.67	0.2	3.45	0.097
OF-RS-6-N	0	3.21	0	0.089	0	0	0	0	0	0	0	0	36.86	0.19	3.21	0.089
OF-RS-7-S	0	6.67	0	0.285	0	0	0	0	0	0	0	0	35.75	0.63	6.67	0.285
OF-RS-8-N	0	1.39	0	0.043	0	0	0	0	0	0	0	0	46.03	0.07	1.39	0.043
OF-RS-9-N	0.1	0.78	0.007	0.029	0	0	0	0	0	0	0	0	43.28	0.05	0.78	0.029

Table 4D: Outfalls

Name	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
OF-RS-10-S	0	0	0	0	0	1
OF-RS-11-N	0	0	0	0	0	1
OF-RS-12-N	0	0	0	0	0	1
OF-RS-13-S	0	0	0	0	0	1
OF-RS-1-N	0	0	0	0	0	1
OF-RS-2-N	0	0	0	0	0	1
OF-RS-3-N	0	0	0	0	0	1
OF-RS-4-S	0	0	0	0	0	1
OF-RS-5-S	0	0	0	0	0	1
OF-RS-6-N	0	0	0	0	0	1
OF-RS-7-S	0	0	0	0	0	1
OF-RS-8-N	0	0	0	0	0	1
OF-RS-9-N	0	0	0	0	0	1

REVIEWED

Table 5A: Conduits

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C1	CB105	CB104		263.405	0.014	0	0	0	0	0.5	0	0	0	NO
C10	J20	J23		207.904	0.014	0	0	0	0	0.5	0	0	0	NO
C1046	J1414	J358	2D_Winthrop	25.153	0.011	0	0	0	0	0	0	0	0	NO
C1075	J1394	J358	2D_Winthrop	19.627	0.011	0	0	0	0	0	0	0	0	NO
C1076	J1371	J358	2D_Winthrop	22.144	0.011	0	0	0	0	0	0	0	0	NO
C11	CB4	CB3		28.475	0.014	0	0	0	0	0.5	0	0	0	NO
C1106	J1372	J359	2D_Winthrop	26.203	0.011	0	0	0	0	0	0	0	0	NO
C111	J66	J445		263.845	0.011	0	0	0	0	0	0	0	0	NO
C1146	J1372	J350	2D_Winthrop	26.17	0.011	0	0	0	0	0	0	0	0	NO
C1192	J1371	J350	2D_Winthrop	21.554	0.011	0	0	0	0	0	0	0	0	NO
C12	CB3	CB2		48.17	0.014	0	0	0	0	0.5	0	0	0	NO
C1202	J1350	J350	2D_Winthrop	16.278	0.011	0	0	0	0	0	0	0	0	NO
C13	CB2	CB1		25.561	0.014	0	0	0	0	0.5	0	0	0	NO
C16	MH5	CB6		111.613	0.014	0	0	0	0	0.5	0	0	0	NO
C17	CB6	MH3		140.635	0.014	0	0	0	0	0.5	0	0	0	NO
C18	MH18	WinthropPond	Zone6	525.428	0.01	0	0	0	0	0	0	0	0	NO
C2	CB104	CB112		471.237	0.014	0	0	0	0	0.5	0	0	0	NO
C2192	J1128	J207	2D_Court	26.183	0.011	0	0	0	0	0	0	0	0	NO
C2193	J1128	J206	2D_Court	23.535	0.011	0	0	0	0	0	0	0	0	NO
C2201	J1129	J207	2D_Court	23.818	0.011	0	0	0	0	0	0	0	0	NO
C2215	J1127	J206	2D_Court	22.139	0.011	0	0	0	0	0	0	0	0	NO
C2268	J1109	J206	2D_Court	23.545	0.011	0	0	0	0	0	0	0	0	NO
C2302	J1094	J206	2D_Court	25.776	0.011	0	0	0	0	0	0	0	0	NO
C2325	J1094	J199	2D_Court	21.342	0.011	0	0	0	0	0	0	0	0	NO
C2386	J1073	J199	2D_Court	20.667	0.011	0	0	0	0	0	0	0	0	NO
C2406	J189	J199	2D_Court	24.248	0.15	0	0	0	0	0	0	0	0	NO

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C27	J23	OF-RS-2-N		16.68	0.014	0	0	0	0	0.5	0	0	0	NO
C3	CB112	MH4		247.996	0.014	0	0	0	0	0.5	0	0	0	NO
C31	CB36	J32		47.227	0.014	0	0	0	0	0.5	0	0	0	NO
C32	CB23	CB34		62.955	0.011	0	0	0	0	0.5	0	0	0	NO
C33	CB24	WinthropPond	Zone6	88.47	0.011	0	0	0	0	0.5	0	0	0	NO
C34	CB34	CB24		44.772	0.011	0	0	0	0	0.5	0	0	0	NO
C37	CB30	DW#9		15.234	0.014	0	0	0	0	0.5	0	0	0	NO
C38	CB29	DW#9		20.886	0.014	0	0	0	0	0.5	0	0	0	NO
C39	CB27	MH18		54.24	0.014	0	0	0	0	0.5	0	0	0	NO
C4	MH4	CB101		119.245	0.014	0	0	0	0	0.5	0	0	0	NO
C40	MH8	MH9		25.283	0.014	0	0	0	0	0.5	0	0	0	NO
C41	MH9	MH10		23.109	0.014	0	0	0	0	0.5	0	0	0	NO
C42	MH10	MH18		39.24	0.014	0	0	0	0	0.5	0	0	0	NO
C43	CB33	MH18		40.72	0.014	0	0	0	0	0.5	0	0	0	NO
C44	CB28	MH18		27.307	0.014	0	0	0	0	0.5	0	0	0	NO
C45	MH11	MH18		122.435	0.014	0	0	0	0	0.5	0	0	0	NO
C46	MH12	MH11		84.66	0.014	0	0	0	0	0.5	0	0	0	NO
C464	J422	J421	2D_SouthShankPainter	29.38	0.15	0	0	0	0	0	0	0	0	NO
C47	CB31	MH11		13.987	0.014	0	0	0	0	0.5	0	0	0	NO
C472	J410	J421	2D_SouthShankPainter	27.713	0.15	0	0	0	0	0	0	0	0	NO
C48	CB32	MH11		53.849	0.014	0	0	0	0	0.5	0	0	0	NO
C49	MH14	MH13		212.01	0.014	0	0	0	0	0.5	0	0	0	NO
C5	CB101	MH3		43.639	0.014	0	0	0	0	0.5	0	0	0	NO
C50	MH13	MH12		219.97	0.014	0	0	0	0	0.5	0	0	0	NO
C51	MH16	MH15		116.201	0.014	0	0	0	0	0.5	0	0	0	NO
C512	J410	J409	2D_SouthShankPainter	27.174	0.15	0	0	0	0	0	0	0	0	NO

HERO

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C52	MH15	MH18		432.199	0.014	0	0	0	0	0.5	0	0	0	NO
C53	MH17	MH16		134.35	0.014	0	0	0	0	0.5	0	0	0	NO
C54	CB37	CB36		48.25	0.014	0	0	0	0	0.5	0	0	0	NO
C5450	DW8_CB	CourtStWetlandArea	Zone4	83.766	0.024	4.41	4.06	0	0	0	0	0	0	NO
C5451	J100	CourtStWetlandArea	Zone4	185.585	0.011	0	0	0	0	0	0	0	0	NO
C5452	CB1	MH1		12.777	0.014	0	0	0	0	0	0	0	0	NO
C5453	MH1	OF-SP-1-WJ		20.094	0.014	0	0	0	0	0	0	0	0	NO
C5454	MH2	MH1		190.137	0.014	0	0	0	0	0	0	0	0	NO
C5455	MH3	MH2		114.494	0.014	0	0	0	0	0	0	0	0	NO
C547	J1551	J409	2D_SouthShankPainter	22.535	0.011	0	0	0	0	0	0	0	0	NO
C55	CB38	CB37		20.613	0.014	0	0	0	0	0.5	0	0	0	NO
C56	CB35	J32		19.765	0.014	0	0	0	0	0.5	0	0	0	NO
C57	J18	OF-RS-1-N		45.993	0.014	0	0	0	0	0.5	0	0	0	NO
C58	J22	J23		125.62	0.014	0	0	0	0	0.5	0	0	0	NO
C59	J11	J13		35.428	0.014	0	0	0	0	0.5	0	0	0	NO
C60	J13	OF-RS-3-N		122.618	0.014	0	0	0	0	0.5	0	0	0	NO
C605	J1539	J397	2D_SouthShankPainter	26.212	0.011	0	0	0	0	0	0	0	0	NO
C607	J1527	J397	2D_SouthShankPainter	26.943	0.011	0	0	0	0	0	0	0	0	NO
C61	J5	J8		70.68	0.014	0	0	0	0	0.5	0	0	0	NO
C62	J8	OF-RS-4-S		67.751	0.014	0	0	0	0	0.5	0	0	0	NO
C6389	DW1_CB	DW1		15	0.01	0	0	0	0	0	0	0	0	NO
C64	J4	J7		70.823	0.014	0	0	0	0	0.5	0	0	0	NO
C65	J7	OF-RS-5-S		67.331	0.014	0	0	0	0	0.5	0	0	0	NO
C650	J1510	J389	2D_SouthShankPainter	18.564	0.011	0	0	0	0	0	0	0	0	NO
C66	J3	J1		75.518	0.014	0	0	0	0	0.5	0	0	0	NO
C67	J1	OF-RS-6-N	Zone1	64.921	0.014	0	0	0	0	0.5	0	0	0	NO

HERD

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C68	J6	J2		76.875	0.014	0	0	0	0	0.5	0	0	0	NO
C6814	J445	J611		301.421	0.011	0	0	0	0	0	0	0	0	NO
C6815	J611	J564		169.498	0.011	0	0	0	0	0	0	0	0	NO
C6816	J564	J661		29.034	0.011	0	0	0	0	0	0	0	0	NO
C69	J2	OF-RS-11-N	Zone1	52.784	0.014	0	0	0	0	0.5	0	0	0	NO
C70	J9	J10		77.687	0.014	0	0	0	0	0.5	0	0	0	NO
C71	J10	OF-RS-10-S	Zone1	69.271	0.014	0	0	0	0	0.5	0	0	0	NO
C7140	DW2_CB	DW2		15	0.01	0	0	0	0	0	0	0	0	NO
C7141	DW3/CB_CB	DW3/CB		15	0.01	0	0	0	0	0	0	0	0	NO
C7142	DW5_CB	DW5		15	0.01	0	0	0	0	0	0	0	0	NO
C7143	DW6_CB	DW6		15	0.01	0	0	0	0	0	0	0	0	NO
C7144	DW7_CB	DW7		15	0.01	0	0	0	0	0	0	0	0	NO
C7145	DW8_CB	DW8		15	0.01	0	0	0	0	0	0	0	0	NO
C7146	DW4/CB_CB	DW4/CB		15	0.01	0	0	0	0	0	0	0	0	NO
C7147	OF-SP-1-WJ	DuckPond	Zone2	20	0.014	0	0	0	0	0.5	0	0.5	0	NO
C72	J17	J16		75.234	0.014	0	0	0	0	0.5	0	0	0	NO
C73	J16	OF-RS-9-N	Zone1	53.115	0.014	0	0	0	0	0.5	0	0	0	NO
C74	J15	J14		75.097	0.014	0	0	0	0	0.5	0	0	0	NO
C75	J14	OF-RS-8-N	Zone1	60.067	0.014	0	0	0	0	0.5	0	0	0	NO
C76	J25	J26		70.204	0.014	0	0	0	0	0.5	0	0	0	NO
C77	J26	OF-RS-7-S	Zone1	74.453	0.014	0	0	0	0	0.5	0	0	0	NO
C78	J31	J30		52.913	0.014	0	0	0	0	0.5	0	0	0	NO
C79	J30	OF-RS-13-S	Zone1	50.854	0.014	0	0	0	0	0.5	0	0	0	NO
C80	J27	J28		84.437	0.014	0	0	0	0	0.5	0	0	0	NO
C81	J28	J32	Zone1	401.87	0.014	0	0	0	0	0.5	0	0	0	NO
C82	J29	J28		113.251	0.014	0	0	0	0	0.5	0	0	0	NO

HERD

Table 5A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.	Seepage Rate (in/hr)	Flap Gate
C83	J32	OF-RS-12-N	Zone1	21.49	0.014	0	0	0	0	0.5	0	0	0	NO
C9	J12	J20		67.86	0.014	0	0	0	0	0.5	0	0	0	NO

Table 5B: Conduits

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Exit Loss Coeff.	Avg. Loss Coeff.	Max. |Flow| (cfs)
C1	CIRCULAR	1	0	0	0	1				NO		NO	0.02313	0	0	4.04
C10	CIRCULAR	1	0	0	0	1				NO		NO	0.03851	0	0	5.36
C1046	RECT_OPEN	30	19.348	2	0	1				NO		NO	0.05722	0	0	3.94
C1075	RECT_OPEN	30	16.356	2	0	1				NO		NO	0.04938	0	0	2.23
C1076	RECT_OPEN	30	17.034	2	0	1				NO		NO	0.04684	0	0	0.27
C11	CIRCULAR	1	0	0	0	1				NO		NO	0.00808	0	0	0.02
C1106	RECT_OPEN	30	18.716	2	0	1				NO		NO	0.04087	0	0	1.6
C111	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.01404	0	0	20.4
C1146	RECT_OPEN	30	18.693	2	0	1				NO		NO	0.04092	0	0	1.6
C1192	RECT_OPEN	30	17.962	2	0	1				NO		NO	0.04812	0	0	0.42
C12	CIRCULAR	1	0	0	0	1				NO		NO	0.00104	0	0	0.08
C1202	RECT_OPEN	30	12.521	2	0	1				NO		NO	0.0484	0	0	31.71
C13	CIRCULAR	1	0	0	0	1				NO		NO	0.01956	0	0	4.35
C16	CIRCULAR	1	0	0	0	1				NO		NO	0.00332	0	0	1.03
C17	CIRCULAR	1	0	0	0	1				NO		NO	0.00711	0	0	3.11
C18	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00784	0	0	13.17
C2	CIRCULAR	1	0	0	0	1				NO		NO	0.00541	0	0	3.04
C2192	RECT_OPEN	30	18.702	2	0	1				NO		NO	0.11725	0	0	0.02

Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C2193	RECT_OPEN	30	18.104	2	0	1				NO		NO	0.13065	0.02
C2201	RECT_OPEN	30	19.848	2	0	1				NO		NO	0.0917	0.01
C2215	RECT_OPEN	30	17.03	2	0	1				NO		NO	0.20692	0.1
C2268	RECT_OPEN	30	19.621	2	0	1				NO		NO	0.26381	0.19
C2302	RECT_OPEN	30	19.828	2	0	1				NO		NO	0.26004	1.22
C2325	RECT_OPEN	30	17.785	2	0	1				NO		NO	0.31905	1.21
C2386	RECT_OPEN	30	17.222	2	0	1				NO		NO	0.35436	15.49
C2406	RECT_OPEN	30	20.207	2	0	1				NO		NO	0.32717	5.66
C27	CIRCULAR	1	0	0	0	1				NO		NO	0.04441	6.78
C3	CIRCULAR	1	0	0	0	1				NO		NO	0.00464	3.17
C31	CIRCULAR	1	0	0	0	1				NO		NO	0.03157	6.04
C32	CIRCULAR	1	0	0	0	1				NO		NO	0.0108	2.92
C33	CIRCULAR	1	0	0	0	1				NO		NO	0.01798	4.21
C34	CIRCULAR	1	0	0	0	1				NO		NO	0.00156	3.87
C37	CIRCULAR	1	0	0	0	1				NO		NO	0.28829	1.37
C38	CIRCULAR	1	0	0	0	1				NO		NO	0.18151	1.37
C39	CIRCULAR	1	0	0	0	1				NO		NO	0.04392	0.56
C4	CIRCULAR	1	0	0	0	1				NO		NO	0.01048	3.8
C40	CIRCULAR	1	0	0	0	1				NO		NO	0.00435	0.07
C41	CIRCULAR	1	0	0	0	1				NO		NO	-0.00606	0.13
C42	CIRCULAR	1	0	0	0	1				NO		NO	0.06692	0.19
C43	CIRCULAR	1	0	0	0	1				NO		NO	-0.00172	6.83
C44	CIRCULAR	1	0	0	0	1				NO		NO	-0.00439	0.73
C45	CIRCULAR	1	0	0	0	1				NO		NO	0.01944	5.01
C46	CIRCULAR	1	0	0	0	1				NO		NO	0.0473	5.86
C464	RECT_OPEN	30	20.986	2	0	1				NO		NO	0.11675	0.49

DRAFT

Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C47	CIRCULAR	1	0	0	0	1				NO		NO	0.06088	3.74
C472	RECT_OPEN	30	23.094	2	0	1				NO		NO	0.10717	1.46
C48	CIRCULAR	1	0	0	0	1				NO		NO	0.0039	2.56
C49	CIRCULAR	0.833	0	0	0	1				NO		NO	0.03304	1.08
C5	CIRCULAR	1	0	0	0	1				NO		NO	0.01146	3.79
C50	CIRCULAR	1	0	0	0	1				NO		NO	0.05463	3.55
C51	CIRCULAR	1	0	0	0	1				NO		NO	0.0043	2.8
C512	RECT_OPEN	30	20.903	2	0	1				NO		NO	0.17295	1.95
C52	CIRCULAR	1	0	0	0	1				NO		NO	0.04489	3.45
C53	CIRCULAR	1	0	0	0	1				NO		NO	0.02189	0.71
C54	CIRCULAR	1	0	0	0	1				NO		NO	0.00497	4.51
C5450	CIRCULAR	1	0	0	0	1				NO		NO	0.07073	1.77
C5451	CIRCULAR	1	0	0	0	1				NO		NO	0.00167	2.66
C5452	CIRCULAR	1	0	0	0	1				NO		NO	0.06667	4.34
C5453	CIRCULAR	1	0	0	0	1				NO		NO	0.00299	10.15
C5454	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00447	6.5
C5455	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00437	6.49
C547	RECT_OPEN	30	17.335	2	0	1				NO		NO	0.19457	12.2
C55	CIRCULAR	1	0	0	0	1				NO		NO	0.03009	4.19
C56	CIRCULAR	1	0	0	0	1				NO		NO	0.06388	0.41
C57	CIRCULAR	1	0	0	0	1				NO		NO	0.03416	1.88
C58	CIRCULAR	1	0	0	0	1				NO		NO	0.05181	1.42
C59	CIRCULAR	1	0	0	0	1				NO		NO	0.00847	3.26
C60	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01085	7.37
C605	RECT_OPEN	30	20.163	2	0	1				NO		NO	0.15568	0.72
C607	RECT_OPEN	30	19.245	2	0	1				NO		NO	0.14871	0.11

DRAFT

Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C61	CIRCULAR	1	0	0	0	1				NO		NO	0.0099	1.79
C62	CIRCULAR	1	0	0	0	1				NO		NO	0.17455	6
C6389	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.19
C64	CIRCULAR	1	0	0	0	1				NO		NO	0.02401	1.68
C65	CIRCULAR	1	0	0	0	1				NO		NO	0.20909	3.45
C650	RECT_OPEN	30	15.47	2	0	1				NO		NO	0.05216	0.01
C66	CIRCULAR	1	0	0	0	1				NO		NO	0.00397	1.35
C67	CIRCULAR	1	0	0	0	1				NO		NO	0.02666	3.21
C68	CIRCULAR	1	0	0	0	1				NO		NO	0.00781	5.9
C6814	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00739	28.27
C6815	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00493	49.91
C6816	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00696	50.65
C69	CIRCULAR	1	0	0	0	1				NO		NO	0.05236	5.89
C70	CIRCULAR	1	0	0	0	1				NO		NO	0.01287	0
C71	CIRCULAR	1	0	0	0	1				NO		NO	0.10685	1.81
C7140	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.47
C7141	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.08
C7142	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.37
C7143	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.42
C7144	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.22
C7145	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.09
C7146	CIRCULAR	1	0	0	0	1				NO		NO	0.13453	0.03
C7147	CIRCULAR	1.5	0	0	0	1				NO		NO	0.03352	10.15
C72	CIRCULAR	1	0	0	0	1				NO		NO	0.00798	0.75
C73	CIRCULAR	1	0	0	0	1				NO		NO	0.03523	0.75
C74	CIRCULAR	1	0	0	0	1				NO		NO	0.00266	1.39

DRAFT

Table 5B: Conduits (continued...)

Name	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C75	CIRCULAR	1	0	0	0	1				NO		NO	0.04867	1.39
C76	CIRCULAR	1	0	0	0	1				NO		NO	0.0057	2.52
C77	CIRCULAR	1	0	0	0	1				NO		NO	0.06663	6.67
C78	CIRCULAR	1	0	0	0	1				NO		NO	0.00567	5.14
C79	CIRCULAR	1	0	0	0	1				NO		NO	0.01337	8.82
C80	CIRCULAR	1	0	0	0	1				NO		NO	0.01149	5.23
C81	CIRCULAR	1	0	0	0	1				NO		NO	0.01911	9.76
C82	CIRCULAR	1	0	0	0	1				NO		NO	0.00327	6.5
C83	CIRCULAR	1	0	0	0	1				NO		NO	0.04658	15.69
C9	CIRCULAR	1	0	0	0	1				NO		NO	0.00737	3.43

Table 5C: Conduits

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C1	10/31/2018 12:20 PM	5.14	0.8	1	0			1	0	0	0	0
C10	10/31/2018 12:05 PM	7.56	0.83	0.85	0			1	0	0	0	0
C1046	10/31/2018 12:16 PM	0.51	0	0.02	0			1	0	0	0	0
C1075	10/31/2018 12:17 PM	0.33	0	0.02	0			1	0	0	0	0
C1076	10/31/2018 12:09 PM	0.03	0	0.02	0			1	0	0	0	0
C11	10/31/2018 11:47 AM	0.06	0.01	1	0			1	0	0	0	0
C1106	10/31/2018 12:09 PM	0.2	0	0.01	0			1	0	0	0	0
C111	10/31/2018 12:20 PM	4.28	0.21	0.48	0			1	0	0	0	0
C1146	10/31/2018 12:09 PM	0.16	0	0.02	0			1	0	0	0	0
C1192	10/31/2018 12:09 PM	0.04	0	0.02	0			1	0	0	0	0

Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C12	10/31/2018 11:47 AM	0.15	0.07	1	0			1	0	0	0	0
C1202	10/31/2018 12:08 PM	3.88	0	0.02	0			1	0	0	0	0
C13	10/31/2018 12:05 PM	5.53	0.94	1	0			1	0	0	0	0
C16	10/31/2018 11:56 AM	1.31	0.54	1	0			1	0	0	0	0
C17	10/31/2018 13:12 PM	3.96	1.11	1	0			1	0	0	0	0
C18	10/31/2018 12:05 PM	7.46	1.09	1	0			1	0	0	0	0
C2	10/31/2018 15:17 PM	3.87	1.25	1	0			1	0	0	0	0
C2192	10/31/2018 12:07 PM	0.03	0	0.01	0			1	0	0	0	0
C2193	10/31/2018 12:07 PM	0.01	0	0.01	0			1	0	0	0	0
C2201	10/31/2018 00:51 AM	0.01	0	0.01	0			1	0	0	0	0
C2215	10/31/2018 12:06 PM	0.03	0	0.01	0			1	0	0	0	0
C2268	10/31/2018 12:06 PM	0.04	0	0.01	0			1	0	0	0	0
C2302	10/31/2018 12:06 PM	0.27	0	0.01	0			1	0	0	0	0
C2325	10/31/2018 12:06 PM	0.19	0	0.01	0			1	0	0	0	0
C2386	10/31/2018 12:06 PM	2.38	0	0.01	0			1	0	0	0	0
C2406	10/31/2018 12:05 PM	0.66	0	0.01	0			1	0	0	0	0
C27	10/31/2018 12:05 PM	9.12	0.97	0.9	0			1	0	0	0	0
C3	10/31/2018 14:57 PM	4.03	1.41	1	0			1	0	0	0	0
C31	10/31/2018 12:05 PM	7.68	1.03	1	0			1	0	0	0	0
C32	10/31/2018 12:26 PM	3.71	0.67	1	0			1	0	0	0	0
C33	10/31/2018 12:05 PM	5.36	0.75	1	0			1	0	0	0	0
C34	10/31/2018 12:03 PM	4.93	2.33	1	0			1	0	0	0	0
C37	10/31/2018 12:05 PM	1.74	0.08	1	0			1	0	0	0	0
C38	10/31/2018 12:05 PM	1.74	0.1	1	0			1	0	0	0	0
C39	10/31/2018 12:05 PM	0.72	0.08	1	0			1	0	0	0	0
C4	10/31/2018 11:46 AM	4.84	1.12	1	0			1	0	0	0	0

HEARD

Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C40	10/31/2018 11:53 AM	0.62	0.03	1	0			1	0	0	0	0
C41	10/31/2018 11:53 AM	1.28	0.05	1	0			1	0	0	0	0
C42	10/31/2018 11:54 AM	0.38	0.02	1	0			1	0	0	0	0
C43	10/31/2018 11:40 AM	8.7	4.98	1	0			1	0	0	0	0
C44	10/31/2018 12:05 PM	0.93	0.33	1	0			1	0	0	0	0
C45	10/31/2018 12:17 PM	6.38	1.09	1	0			1	0	0	0	0
C46	10/31/2018 12:06 PM	7.46	0.81	1	0			1	0	0	0	0
C464	10/31/2018 12:05 PM	0.35	0	0.03	0			1	0	0	0	0
C47	10/31/2018 12:05 PM	4.77	0.46	1	0			1	0	0	0	0
C472	10/31/2018 12:06 PM	0.67	0	0.03	0			1	0	0	0	0
C48	10/31/2018 12:05 PM	3.26	1.24	1	0			1	0	0	0	0
C49	10/31/2018 12:05 PM	4.27	0.29	0.47	0			1	0	0	0	0
C5	10/31/2018 14:11 PM	4.82	1.07	1	0			1	0	0	0	0
C50	10/31/2018 12:05 PM	5.73	0.46	0.74	0			1	0	0	0	0
C51	10/31/2018 12:05 PM	4.59	1.29	0.75	0			1	0	0	0	0
C512	10/31/2018 12:05 PM	0.16	0	0.06	0			1	0	0	0	0
C52	10/31/2018 12:05 PM	5.48	0.49	0.75	0			1	0	0	0	0
C53	10/31/2018 12:05 PM	1.42	0.15	0.63	0			1	0	0	0	0
C54	10/31/2018 12:05 PM	5.74	1.93	1	0			1	0	0	0	0
C5450	10/31/2018 12:06 PM	5.93	0.34	0.41	0			1	0	0	0	0
C5451	10/31/2018 12:20 PM	3.39	1.55	1	0			1	0	0	0	0
C5452	10/31/2018 12:05 PM	5.53	0.51	1	0			1	0	0	0	0
C5453	10/31/2018 12:05 PM	12.92	5.62	1	0			1	0	0	0	0
C5454	10/31/2018 12:35 PM	5.3	1.62	1	0			1	0	0	0	0
C5455	10/31/2018 12:38 PM	5.29	1.64	1	0			1	0	0	0	0
C547	10/31/2018 12:05 PM	1.25	0	0.06	0			1	0	0	0	0

Legacy

Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C55	10/31/2018 12:05 PM	5.33	0.73	1	0			1	0	0	0	0
C56	10/31/2018 11:51 AM	0.93	0.05	1	0			1	0	0	0	0
C57	10/31/2018 12:05 PM	6.56	0.31	0.39	0			1	0	0	0	0
C58	10/31/2018 12:05 PM	2.65	0.19	0.65	0			1	0	0	0	0
C59	10/31/2018 12:05 PM	4.15	1.07	1	0			1	0	0	0	0
C60	10/31/2018 12:05 PM	6.03	0.73	0.65	0			1	0	0	0	0
C605	10/31/2018 12:06 PM	0.07	0	0.06	0			1	0	0	0	0
C607	10/31/2018 12:06 PM	0.01	0	0.06	0			1	0	0	0	0
C61	10/31/2018 12:05 PM	4.31	0.54	0.52	0			1	0	0	0	0
C62	10/31/2018 12:05 PM	16.25	0.43	0.48	0			1	0	0	0	0
C6389	10/31/2018 12:02 PM	0.34	0.01	1	0			1	0	0	0	0
C64	10/31/2018 12:05 PM	6.14	0.33	0.38	0			1	0	0	0	0
C65	10/31/2018 12:05 PM	15.1	0.23	0.33	0			1	0	0	0	0
C650	10/31/2018 12:12 PM	0	0	0.01	0			1	0	0	0	0
C66	10/31/2018 12:05 PM	2.7	0.65	0.61	0			1	0	0	0	0
C67	10/31/2018 12:05 PM	6.85	0.59	0.58	0			1	0	0	0	0
C68	10/31/2018 12:05 PM	8.11	2.02	0.87	0			1	0	0	0	0
C6814	10/31/2018 12:16 PM	3.85	0.4	0.74	0			1	0	0	0	0
C6815	10/31/2018 12:15 PM	5.73	0.86	0.87	0			1	0	0	0	0
C6816	10/31/2018 12:15 PM	7.48	0.74	0.68	0			1	0	0	0	0
C69	10/31/2018 12:05 PM	9.96	0.78	0.71	0			1	0	0	0	0
C70	10/31/2018 00:00 AM	0	0	0.14	0			1	0	0	0	0
C71	10/31/2018 12:05 PM	9.97	0.17	0.28	0			1	0	0	0	0
C7140	10/31/2018 12:10 PM	1.18	0.03	1	0			1	0	0	0	0
C7141	10/31/2018 12:05 PM	0.3	0	1	0			1	0	0	0	0
C7142	10/31/2018 12:05 PM	1	0.02	1	0			1	0	0	0	0

Table 5C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C7143	10/31/2018 11:40 AM	0.84	0.02	1	0			1	0	0	0	0
C7144	10/31/2018 11:20 AM	0.84	0.01	1	0			1	0	0	0	0
C7145	10/31/2018 10:01 AM	0.56	0.01	1	0			1	0	0	0	0
C7146	10/31/2018 08:30 AM	0.32	0	1	0			1	0	0	0	0
C7147	10/31/2018 12:05 PM	13.34	0.57	0.49	0			1	0	0	0	0
C72	10/31/2018 12:05 PM	3.77	0.25	0.3	0			1	0	0	0	0
C73	10/31/2018 12:05 PM	5.21	0.12	0.24	0			1	0	0	0	0
C74	10/31/2018 12:05 PM	4.04	0.81	0.45	0			1	0	0	0	0
C75	10/31/2018 12:05 PM	6.96	0.19	0.3	0			1	0	0	0	0
C76	10/31/2018 12:05 PM	4.06	1.01	0.74	0			1	0	0	0	0
C77	10/31/2018 12:15 PM	11.41	0.78	0.7	0			1	0	0	0	0
C78	10/31/2018 12:51 PM	6.54	2.06	1	0			1	0	0	0	0
C79	10/31/2018 12:05 PM	11.24	2.31	1	0			1	0	0	0	0
C80	10/31/2018 12:19 PM	6.67	1.48	1	0			1	0	0	0	0
C81	10/31/2018 11:58 AM	12.43	2.13	1	0			1	0	0	0	0
C82	10/31/2018 12:05 PM	8.28	3.44	1	0			1	0	0	0	0
C83	10/31/2018 12:05 PM	19.97	2.2	1	0			1	0	0	0	0
C9	10/31/2018 12:05 PM	4.84	1.21	0.85	0			1	0	0	0	0

Table 5D: Conduits

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C1	AUTOMATIC	2.39	2.39	4.61	0.01	0.01	1	0.53	0.21	0.18	0.86	0	0
C10	AUTOMATIC	0.01	0.01	0.11	0.01	0.01	1	0.02	0	0.48	0.9	0	0
C1046	AUTOMATIC	0	0	0	0	0	1	0.24	0.06	0	0.75	0	0
C1075	AUTOMATIC	0	0	0	0	0	1	0.24	0.06	0	0.75	0	0
C1076	AUTOMATIC	0	0	0	0	0	1	0.24	0	0	0.75	0	0
C11	AUTOMATIC	0.33	0.33	0.43	0.01	0.01	1	0.64	0.05	0	0.72	0	0
C1106	AUTOMATIC	0	0	0	0	0	1	0.24	0	0	0.75	0	0
C111	AUTOMATIC	0	0	0	0	0	1	0.83	0.05	0.02	0.75	0	0
C1146	AUTOMATIC	0	0	0	0	0	1	0.24	0	0	0.75	0	0
C1192	AUTOMATIC	0	0	0	0	0	1	0.24	0	0	0.75	0	0
C12	AUTOMATIC	0.43	0.43	0.46	0.01	0.01	1	0.11	0.36	0	0.5	0	0
C1202	AUTOMATIC	0	0	0	0	0	1	0.24	0.76	0	0.76	0	0
C13	AUTOMATIC	0.46	0.46	0.82	0.01	0.14	1	0.11	0.57	0.33	0.03	0	0
C16	AUTOMATIC	2.3	2.3	2.54	0.01	0.01	1	0.12	0.39	0	0.81	0	0
C17	AUTOMATIC	2.54	2.54	4.28	1.55	1.72	1	0.08	0.87	0	0.8	0	0
C18	AUTOMATIC	0.8	0.8	38.44	0.36	0.36	1	0.01	0.87	0.11	0.87	0	0
C2	AUTOMATIC	4.61	4.61	4.68	4.58	4.57	1	0.08	0.46	0.01	0.78	0	0
C2192	AUTOMATIC	0	0	0	0	0	1	0.02	0.69	0	0.98	0	0
C2193	AUTOMATIC	0	0	0	0	0	1	0.02	0.69	0	0.98	0	0
C2201	AUTOMATIC	0	0	0	0	0	1	0.02	0.54	0	0.98	0	0
C2215	AUTOMATIC	0	0	0	0	0	1	0.02	0.88	0	0.98	0	0
C2268	AUTOMATIC	0	0	0	0	0	1	0.02	0.66	0	0.98	0	0
C2302	AUTOMATIC	0	0	0	0	0	1	0.02	0.68	0	0.98	0	0
C2325	AUTOMATIC	0	0	0	0	0	1	0.02	0.68	0	0.98	0	0
C2386	AUTOMATIC	0	0	0	0	0	1	0.02	0.98	0	0.98	0	0
C2406	AUTOMATIC	0	0	0	0	0	1	0.02	0.98	0	0.98	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C27	AUTOMATIC	0.01	0.11	0.01	0.01	0.01	1	0.02	0.49	0.48	0	0	0
C3	AUTOMATIC	4.34	4.68	4.35	3.2	2.87	1	0.08	0.84	0	0.59	0	0
C31	AUTOMATIC	0.59	0.59	0.72	0.02	0.12	1	0.06	0.29	0.02	0.79	0	0
C32	AUTOMATIC	1.36	1.36	37.1	0.01	0.01	1	0.05	0.95	0	0.17	0	0
C33	AUTOMATIC	37.16	37.16	39.35	0.01	0.01	1	0.02	0.93	0.02	0.16	0	0
C34	AUTOMATIC	37.1	37.1	37.16	1.22	1.94	1	0.05	0.89	0.06	0	0	0
C37	AUTOMATIC	44.46	44.46	46.11	0.01	0.01	1	0.02	0.98	0.01	0.05	0	0
C38	AUTOMATIC	44.6	44.6	46.11	0.01	0.01	1	0.02	0.98	0	0.04	0	0
C39	AUTOMATIC	0.22	0.22	0.98	0.01	0.01	1	0.01	0.96	0	0.98	0	0
C4	AUTOMATIC	4.33	4.35	4.39	2.57	4.26	1	0.08	0.63	0.29	0.51	0	0
C40	AUTOMATIC	0.16	0.16	0.18	0.01	0.01	1	0.25	0.75	0	0	0	0
C41	AUTOMATIC	0.16	0.16	0.18	0.01	0.01	1	0.25	0.03	0	0.73	0	0
C42	AUTOMATIC	0.16	0.16	0.74	0.01	0.01	1	0.01	0.03	0	0.74	0	0
C43	AUTOMATIC	0.98	0.98	2.34	5.6	0.01	1	0.01	0.99	0	0.01	0	0
C44	AUTOMATIC	0.98	0.98	1.05	0.01	0.01	1	0.01	0.99	0	0.01	0	0
C45	AUTOMATIC	0.62	0.62	0.98	0.42	0.45	1	0.01	0.49	0.01	0.96	0	0
C46	AUTOMATIC	0.34	0.34	0.62	0.01	0.01	1	0.5	0.02	0.48	0.98	0	0
C464	AUTOMATIC	0	0	0	0	0	1	0.09	0.03	0	0.76	0	0
C47	AUTOMATIC	0.53	0.53	0.62	0.01	0.01	1	0.5	0.02	0	0.74	0	0
C472	AUTOMATIC	0	0	0	0	0	1	0.09	0.42	0	0.74	0	0
C48	AUTOMATIC	0.6	0.6	0.62	0.17	0.22	1	0.5	0.43	0	0.87	0	0
C49	AUTOMATIC	0	0	0	0	0	1	0.01	0.61	0.33	0.94	0	0
C5	AUTOMATIC	4.24	4.39	4.28	1.93	4.18	1	0.08	0.46	0.01	0.62	0	0
C50	AUTOMATIC	0.01	0.01	0.34	0.01	0.01	1	0.01	0.5	0.49	0.98	0	0
C51	AUTOMATIC	0.01	0.06	0.01	0.2	0.01	1	0.49	0.04	0.46	0.49	0	0
C512	AUTOMATIC	0	0	0	0	0	1	0.09	0.42	0	0.91	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C52	AUTOMATIC	0.01	0.01	0.98	0.01	0.01	1	0.01	0.5	0.01	0.99	0	0
C53	AUTOMATIC	0.01	0.01	0.06	0.01	0.01	1	0.5	0.5	0	0.99	0	0
C54	AUTOMATIC	0.58	0.58	0.59	0.4	0.46	1	0.2	0.53	0.26	0.5	0	0
C5450	AUTOMATIC	0	0	0	0	0	1	0.21	0	0	0	0	0
C5451	AUTOMATIC	38.57	38.57	38.81	3.93	0.01	1	0.02	0.98	0	0.1	0	0
C5452	AUTOMATIC	0.82	0.82	4.12	0.01	0.01	1	0.09	0.4	0	0.81	0	0
C5453	AUTOMATIC	0.41	4.12	0.41	8.27	0.41	1	0.09	0.59	0.32	0.03	0	0
C5454	AUTOMATIC	2.44	3.03	2.44	4.15	2.44	1	0.09	0.91	0	0.79	0	0
C5455	AUTOMATIC	3.03	3.25	3.03	4.2	3.03	1	0.08	0.92	0	0.15	0	0
C547	AUTOMATIC	0	0	0	0	0	1	0.09	0.91	0.01	0.91	0	0
C55	AUTOMATIC	0.54	0.54	0.58	0.01	0.01	1	0.2	0.02	0.28	0.72	0	0
C56	AUTOMATIC	0.59	0.59	0.71	0.01	0.01	1	0.06	0.02	0	0.74	0	0
C57	AUTOMATIC	0	0	0	0	0	1	0.09	0.49	0.42	0	0	0
C58	AUTOMATIC	0.01	0.01	0.11	0.01	0.01	1	0.02	0.42	0	0.91	0	0
C59	AUTOMATIC	0.02	0.09	0.02	0.06	0.02	1	0.12	0.38	0	0.78	0	0
C60	AUTOMATIC	0	0	0	0	0	1	0.12	0.5	0.38	0	0	0
C605	AUTOMATIC	0	0	0	0	0	1	0.09	0.58	0	0.91	0	0
C607	AUTOMATIC	0	0	0	0	0	1	0.09	0.39	0	0.91	0	0
C61	AUTOMATIC	0	0	0	0	0	1	0.16	0.01	0.25	0.5	0	0
C62	AUTOMATIC	0	0	0	0	0	1	0.16	0.49	0.35	0	0	0
C6389	AUTOMATIC	38.19	38.19	41.6	0.01	0.01	1	0.04	0.95	0.01	0.13	0	0
C64	AUTOMATIC	0	0	0	0	0	1	0.11	0.5	0.38	0.51	0	0
C65	AUTOMATIC	0	0	0	0	0	1	0.11	0.5	0.39	0.01	0	0
C650	AUTOMATIC	0	0	0	0	0	1	0.25	0.14	0.01	0.75	0	0
C66	AUTOMATIC	0	0	0	0	0	1	0.13	0.87	0	0.68	0	0
C67	AUTOMATIC	0	0	0	0	0	1	0.13	0.49	0.38	0	0	0

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Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C68	AUTOMATIC	0.01	0.4	0.01	0.48	0.01	1	0.19	0.5	0.32	0.49	0	0
C6814	AUTOMATIC	0	0	0	0	0	1	0.58	0.15	0.02	0.76	0	0
C6815	AUTOMATIC	0	0	0	0	0	1	0.52	0.22	0.21	0.51	0	0
C6816	AUTOMATIC	0	0	0	0	0	1	0.12	0.22	0.26	0.72	0	0
C69	AUTOMATIC	0	0	0	0	0	1	0.19	0.49	0.32	0	0	0
C70	AUTOMATIC	0	0	0	0	0	1	0.15	0	0	0	0	0
C71	AUTOMATIC	0	0	0	0	0	1	0.15	0.49	0.36	0	0	0
C7140	AUTOMATIC	36.11	36.11	38.57	0.01	0.01	1	0.08	0.9	0.02	0.14	0	0
C7141	AUTOMATIC	36.45	36.45	40.93	0.01	0.01	1	0.01	0.98	0.01	0.19	0	0
C7142	AUTOMATIC	35.85	35.85	37.46	0.01	0.01	1	0.02	0.95	0.03	0.18	0	0
C7143	AUTOMATIC	38.19	38.19	40.51	0.01	0.01	1	0.01	0.95	0.03	0.16	0	0
C7144	AUTOMATIC	38.52	38.52	40.91	0.01	0.01	1	0.01	0.95	0.04	0.16	0	0
C7145	AUTOMATIC	39.45	39.45	41.62	0.01	0.01	1	0.02	0.97	0.02	0.14	0	0
C7146	AUTOMATIC	41.56	41.56	44.68	0.01	0.01	1	0.01	0.99	0	0.09	0	0
C7147	AUTOMATIC	0	0	0	0	0	1	0.09	0.68	0.23	0	0	0
C72	AUTOMATIC	0	0	0	0	0	1	0.06	0.53	0.42	0.5	0	0
C73	AUTOMATIC	0	0	0	0	0	1	0.06	0.49	0.45	0	0	0
C74	AUTOMATIC	0	0	0	0	0	1	0.03	0.83	0.13	0.49	0	0
C75	AUTOMATIC	0	0	0	0	0	1	0.04	0.49	0.47	0	0	0
C76	AUTOMATIC	0.01	0.01	0.01	0.01	0.01	1	0.16	0.32	0.01	0.79	0	0
C77	AUTOMATIC	0	0	0	0	0	1	0.16	0.47	0.37	0	0	0
C78	AUTOMATIC	2.48	2.64	2.48	3.12	2.48	1	0.05	0.4	0	0.65	0	0
C79	AUTOMATIC	1.34	2.48	1.34	2.51	1.34	1	0.05	0.56	0.39	0	0	0
C80	AUTOMATIC	0.7	0.7	0.73	0.31	0.37	1	0.05	0.13	0.23	0.74	0	0
C81	AUTOMATIC	0.71	0.73	0.72	0.76	0.71	1	0.05	0.61	0.34	0.61	0	0
C82	AUTOMATIC	0.72	0.74	0.73	0.7	0.64	1	0.05	0.36	0.01	0.71	0	0

Table 5D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)	Maximum Spread (ft)
C83	AUTOMATIC	0.66	0.72	0.66	0.66	0.66	1	0.06	0.59	0.35	0	0	0
C9	AUTOMATIC	0.01	0.04	0.01	0.15	0.01	1	0.02	0.63	0.35	0.5	0	0

Table 5E: Conduits

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C1	0		0	0	0	0	0	0	0	0	0	0
C10	0		0	0	0	0	0	0	0	0	0	0
C1046	0		0	0	0	0	0	0	0	0	0	0
C1075	0		0	0	0	0	0	0	0	0	0	0
C1076	0		0	0	0	0	0	0	0	0	0	0
C11	0		0	0	0	0	0	0	0	0	0	0
C1106	0		0	0	0	0	0	0	0	0	0	0
C111	0		0	0	0	0	0	0	0	0	0	0
C1146	0		0	0	0	0	0	0	0	0	0	0
C1192	0		0	0	0	0	0	0	0	0	0	0
C12	0		0	0	0	0	0	0	0	0	0	0
C1202	0		0	0	0	0	0	0	0	0	0	0
C13	0		0	0	0	0	0	0	0	0	0	0
C16	0		0	0	0	0	0	0	0	0	0	0
C17	0		0	0	0	0	0	0	0	0	0	0
C18	0		0	0	0	0	0	0	0	0	0	0
C2	0		0	0	0	0	0	0	0	0	0	0
C2192	0		0	0	0	0	0	0	0	0	0	0

Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C2193	0		0	0	0	0	0	0	0	0	0	0
C2201	0		0	0	0	0	0	0	0	0	0	0
C2215	0		0	0	0	0	0	0	0	0	0	0
C2268	0		0	0	0	0	0	0	0	0	0	0
C2302	0		0	0	0	0	0	0	0	0	0	0
C2325	0		0	0	0	0	0	0	0	0	0	0
C2386	0		0	0	0	0	0	0	0	0	0	0
C2406	0		0	0	0	0	0	0	0	0	0	0
C27	0		0	0	0	0	0	0	0	0	0	0
C3	0		0	0	0	0	0	0	0	0	0	0
C31	0		0	0	0	0	0	0	0	0	0	0
C32	0		0	0	0	0	0	0	0	0	0	0
C33	0		0	0	0	0	0	0	0	0	0	0
C34	0		0	0	0	0	0	0	0	0	0	0
C37	0		0	0	0	0	0	0	0	0	0	0
C38	0		0	0	0	0	0	0	0	0	0	0
C39	0		0	0	0	0	0	0	0	0	0	0
C4	0		0	0	0	0	0	0	0	0	0	0
C40	0		0	0	0	0	0	0	0	0	0	0
C41	0		0	0	0	0	0	0	0	0	0	0
C42	0		0	0	0	0	0	0	0	0	0	0
C43	0		0	0	0	0	0	0	0	0	0	0
C44	0		0	0	0	0	0	0	0	0	0	0
C45	0		0	0	0	0	0	0	0	0	0	0
C46	0		0	0	0	0	0	0	0	0	0	0
C464	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C47	0		0	0	0	0	0	0	0	0	0	0
C472	0		0	0	0	0	0	0	0	0	0	0
C48	0		0	0	0	0	0	0	0	0	0	0
C49	0		0	0	0	0	0	0	0	0	0	0
C5	0		0	0	0	0	0	0	0	0	0	0
C50	0		0	0	0	0	0	0	0	0	0	0
C51	0		0	0	0	0	0	0	0	0	0	0
C512	0		0	0	0	0	0	0	0	0	0	0
C52	0		0	0	0	0	0	0	0	0	0	0
C53	0		0	0	0	0	0	0	0	0	0	0
C54	0		0	0	0	0	0	0	0	0	0	0
C5450	0		0	0	0	0	0	0	0	0	0	0
C5451	0		0	0	0	0	0	0	0	0	0	0
C5452	0		0	0	0	0	0	0	0	0	0	0
C5453	0		0	0	0	0	0	0	0	0	0	0
C5454	0		0	0	0	0	0	0	0	0	0	0
C5455	0		0	0	0	0	0	0	0	0	0	0
C547	0		0	0	0	0	0	0	0	0	0	0
C55	0		0	0	0	0	0	0	0	0	0	0
C56	0		0	0	0	0	0	0	0	0	0	0
C57	0		0	0	0	0	0	0	0	0	0	0
C58	0		0	0	0	0	0	0	0	0	0	0
C59	0		0	0	0	0	0	0	0	0	0	0
C60	0		0	0	0	0	0	0	0	0	0	0
C605	0		0	0	0	0	0	0	0	0	0	0
C607	0		0	0	0	0	0	0	0	0	0	0

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Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C61	0		0	0	0	0	0	0	0	0	0	0
C62	0		0	0	0	0	0	0	0	0	0	0
C6389	0		0	0	0	0	0	0	0	0	0	0
C64	0		0	0	0	0	0	0	0	0	0	0
C65	0		0	0	0	0	0	0	0	0	0	0
C650	0		0	0	0	0	0	0	0	0	0	0
C66	0		0	0	0	0	0	0	0	0	0	0
C67	0		0	0	0	0	0	0	0	0	0	0
C68	0		0	0	0	0	0	0	0	0	0	0
C6814	0		0	0	0	0	0	0	0	0	0	0
C6815	0		0	0	0	0	0	0	0	0	0	0
C6816	0		0	0	0	0	0	0	0	0	0	0
C69	0		0	0	0	0	0	0	0	0	0	0
C70	0		0	0	0	0	0	0	0	0	0	0
C71	0		0	0	0	0	0	0	0	0	0	0
C7140	0		0	0	0	0	0	0	0	0	0	0
C7141	0		0	0	0	0	0	0	0	0	0	0
C7142	0		0	0	0	0	0	0	0	0	0	0
C7143	0		0	0	0	0	0	0	0	0	0	0
C7144	0		0	0	0	0	0	0	0	0	0	0
C7145	0		0	0	0	0	0	0	0	0	0	0
C7146	0		0	0	0	0	0	0	0	0	0	0
C7147	0		0	0	0	0	0	0	0	0	0	0
C72	0		0	0	0	0	0	0	0	0	0	0
C73	0		0	0	0	0	0	0	0	0	0	0
C74	0		0	0	0	0	0	0	0	0	0	0

Draft

Table 5E: Conduits (continued...)

Name	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
C75	0		0	0	0	0	0	0	0	0	0	0
C76	0		0	0	0	0	0	0	0	0	0	0
C77	0		0	0	0	0	0	0	0	0	0	0
C78	0		0	0	0	0	0	0	0	0	0	0
C79	0		0	0	0	0	0	0	0	0	0	0
C80	0		0	0	0	0	0	0	0	0	0	0
C81	0		0	0	0	0	0	0	0	0	0	0
C82	0		0	0	0	0	0	0	0	0	0	0
C83	0		0	0	0	0	0	0	0	0	0	0
C9	0		0	0	0	0	0	0	0	0	0	0

Table 5F: Conduits

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C1	80.286	0	1
C10	63.364	0	1
C1046	14.82	0	1
C1075	8.808	0	1
C1076	11.283	0	1
C11	8.687	0	1
C1106	13.528	0	1
C111	80.426	0	1
C1146	16.208	0	1
C1192	11.719	0	1

Legacy

Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C12	14.69	0	1
C1202	7.334	0	1
C13	7.798	0	1
C16	34.026	0	1
C17	42.866	0	1
C18	160.147	0	1
C2	143.639	0	1
C2192	14.435	0	1
C2193	11.775	0	1
C2201	10.526	0	1
C2215	11.168	0	1
C2268	13.21	0	1
C2302	15.72	0	1
C2325	10.634	0	1
C2386	9.908	0	1
C2406	15.24	0	1
C27	5.088	0	1
C3	75.585	0	1
C31	14.395	0	1
C32	19.183	0	1
C33	26.965	0	1
C34	13.641	0	1
C37	4.651	0	1
C38	6.346	0	1
C39	16.539	0	1
C4	36.353	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C40	7.713	0	1
C41	7.051	0	1
C42	11.966	0	1
C43	12.41	0	1
C44	8.317	0	1
C45	37.311	0	1
C46	25.797	0	1
C464	15.06	0	1
C47	4.255	0	1
C472	15.24	0	1
C48	16.408	0	1
C49	64.613	0	1
C5	13.308	0	1
C50	67.039	0	1
C51	35.426	0	1
C512	15.241	0	1
C52	131.742	0	1
C53	40.957	0	1
C54	14.707	0	1
C5450	25.532	0	1
C5451	56.57	0	1
C5452	3.894	0	1
C5453	6.125	0	1
C5454	57.954	0	1
C5455	34.898	0	1
C547	11.883	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C55	6.283	0	1
C56	6.024	0	1
C57	18.673	0	1
C58	38.297	0	1
C59	10.812	0	1
C60	37.396	0	1
C605	15.431	0	1
C607	16.55	0	1
C61	21.536	0	1
C62	20.62	0	1
C6389	0.268	0	1
C64	21.578	0	1
C65	20.515	0	1
C650	8.842	0	1
C66	23.027	0	1
C67	19.796	0	1
C68	23.439	0	1
C6814	91.879	0	1
C6815	51.67	0	1
C6816	8.85	0	1
C69	16.096	0	1
C70	23.672	0	1
C71	21.106	0	1
C7140	0.285	0	1
C7141	0.095	0	1
C7142	0.134	0	1

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Table 5F: Conduits (continued...)

Name	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
C7143	0.164	0	1
C7144	0.095	0	1
C7145	0.095	0	1
C7146	0.164	0	1
C7147	93.011	0	1
C72	22.939	0	1
C73	16.198	0	1
C74	22.898	0	1
C75	18.316	0	1
C76	21.39	0	1
C77	22.684	0	1
C78	16.12	0	1
C79	15.484	0	1
C80	25.75	0	1
C81	122.49	0	1
C82	34.523	0	1
C83	6.549	0	1
C9	20.69	0	1

DRAFT

Table 6A: ARM Subcatchments

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S1	1010487.317	2847818.725			SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB2	0.913	300	3.519
S10	1005708.415	2844682.934	Set		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J20	0.352	300	8.406
S103_1	1007362.004	2845719.622	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J25	0.781	300	11.045
S103_2	1007058.318	2845579.838	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J1	0.636	300	14.154
S106	1011862.971	2845745.351	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH13	0.436	300	5.668
S11	1011368.787	2845042.386	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB30	0.24	300	11.124
S112	1011765.715	2845607.459	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH12	0.576	300	11.629
S117	1006645.061	2845292.582	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J8	1.279	300	7.392
S119	1011710.229	2845450.521	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB32	0.487	300	13.311
S12	1009155.269	2846806.185	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J28	1.163	300	11.343
S121	1006652.612	2845362.099	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J4	0.365	300	7.731
S122	1011582.402	2845423.142	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH11	0.033	300	5.762
S123_1	1011641.466	2845102.141	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB33	5.513	300	8.307
S126	1006771.027	2845326.81	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J7	0.373	300	8.112
S128_1	1011314.008	2844967.879	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB29	0.912	300	6.141
S128_3	1011439.667	2845206.557	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB27	0.082	300	5.357
S128_4	1011509.295	2845310.923	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	cb28	0.069	300	3.231
S13	1010995.082	2845155.655			SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J417	9.522	300	9.391
S130	1006150.145	2845207.413	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J5	1.595	300	27.808
S135	1006040.366	2844957.721	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J13	0.89	300	15.026
S135_2	1005799.316	2844651.484	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J12	0.528	300	15.451
S135_4	1005715.768	2844640.674	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J12	0.218	300	10.886
S138	1006093.058	2844885.605	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J11	0.718	300	12.176
S14	1010073.132	2846967.657			SCS Dimensionless UH	100yr24hr_NOAA_6.92in	OF-RS-13-S	8.285	300	10.506
S141	1011205.465	2844879.436	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH15	0.124	300	4.749
S2	1010278.468	2848203.067		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DuckPond	26.281	300	10.923

Table 6A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S2_1	1010537.761	2846249.488		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CourtStWetlandArea	0.379	300	16.627
S2_3	1010958.977	2846249.347		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J1134	10.8	300	12.201
S23	1009578.801	2847171.57	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB36	0.524	300	10.193
S25	1010728.262	2847636.033		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH4	2.032	300	5.744
S26	1010339.144	2847226.967		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J110	0.546	300	3.813
S26_1	1010334.853	2847481.827		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH5	0.38	300	6.003
S26_2	1010265.57	2847510.507		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J30	2.305	300	6.225
S28	1010126.571	2847580.706		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J31	9.662	300	8.684
S30	1011355.912	2847415.335		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB104	4.405	300	11.115
S32	1010496.691	2847333.793		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB6	2.021	300	6.639
S33	1010881.808	2847329.337		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J611	8.854	300	10.761
S36	1011722.209	2847132.617		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB105	12.204	300	9.923
S46_2	1009603.012	2847123.201	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB37	0.538	300	4.62
S49_1	1010739.79	2846918.195		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J893	3.133	300	10.21
S49_2	1010372.03	2846602.463		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J975	1.131	300	12.177
S49_3	1010535.049	2846799.21		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J908	0.276	300	4.194
S49_4	1010640.175	2846724.247		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J935	2.232	300	9.012
S49_5	1010446.731	2846786.408		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J915	0.082	300	4.497
S49_6	1010444.732	2846453.095		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J1024	0.451	300	8.23
S49_8	1010511.018	2846349.272		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J189	0.18	300	4.348
S5	1011269.647	2845445.835		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	WinthropPond	1.084	300	5.645
S52_2	1009925.542	2847338.791	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J30	0.249	300	3.955
S53	1011172.364	2846593.041		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J121	3.103	300	17.273
S6	1005494.968	2844432.915	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J22	0.279	300	8.507
S6_1	1008971.765	2846458.918	Set		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J6	1.238	300	9.56
S6_3	1009439.368	2846742.738	Set		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J27	4.78	300	12.857

Table 6A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S6_4	1009688.465	2847016.819	Set		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB38	1.549	300	10.774
S7	1011037.519	2844670.263	Set		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH17	0.125	300	9.11
S70_2	1010722.908	2845836.1		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J335	2.87	300	7.148
S75_2	1008589.068	2846300.144	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J6	1.627	300	11.794
S76_1	1011305.239	2845685.652		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J1353	5.302	300	12.888
S8	1005452.29	2844454.885			SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J18	0.372	300	7.857
S80_1	1010894.296	2845731.405		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB23	0.578	300	4.766
S9	1011213.411	2844798.075	Set		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH16	0.38	300	3.94
S90_1	1008157.655	2846015.314	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J17	0.138	300	5.266
S90_2	1008454.394	2846213.676	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J10	0.441	300	10.746
S97_2	1007093.128	2845499.64	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J3	0.299	300	6.44
S99_2	1007877.635	2845863.999	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J15	0.25	300	2.582
R1_1	-7814364.971	5169049.977	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J31	0.487	300	6.426
R3_1	-7813934.519	5168322.624		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB34	0.308	300	4.658
R3_3	-7813905.512	5168324.095		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB24	0.039	300	4.658
R3_4	-7813890.128	5168347.762		WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	WinthropPond	0.788	300	4.66
S98_3	-7813503.99	5168429.516	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH14	0.201	300	13.371
R4_1	-7815245.33	5168440.929	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J26	2.024	300	10.977
R4_2	-7815172.403	5168526.52	Set	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	OF-RS-9-N	0.479	300	10.988
R5	-7814662.994	5168936.48	Set		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J29	1.586	300	10.734

Table 6B: ARM Subcatchments

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.002	SCS CN
S10	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S103_1	0	0.05	11.618	3	0.5	4	7	0	1.93	4.739	0.413	User entered value	5	SCS CN
S103_2	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S106	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.041	SCS CN
S11	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S112	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S117	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.198	SCS CN
S119	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S12	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	6.7	SCS CN
S121	0	0.05	11.504	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S122	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S123_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S126	0	0.05	11.514	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.008	SCS CN
S128_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S128_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S128_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S13	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	10.3	SCS CN
S130	0	0.05	12.119	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.3	SCS CN
S135	0	0.05	11.577	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_2	0	0.05	11.529	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_4	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S138	0	0.05	11.53	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S14	0	0.05	12.22	3	0.5	4	7	0	1.982	4.347	0.41	User entered value	6.698	SCS CN
S141	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S2	0	0.05	12.46	3	0.5	4	7	0	2.868	2.723	0.397	User entered value	12.8	SCS CN

HERO

Table 6B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S2_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S2_3	0	0.05	11.581	3	0.5	4	7	0	2.396	1.208	0.39	User entered value	9.5	SCS CN
S23	0	0.05	11.5	3	0.5	4	7	0	1.932	4.728	0.413	User entered value	5	SCS CN
S25	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	13.9	SCS CN
S26	0	0.05	12.536	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S26_1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S26_2	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.199	SCS CN
S28	0	0.05	11.835	3	0.5	4	7	0	2.257	4.036	0.407	User entered value	7.722	SCS CN
S30	0	0.05	11.99	3	0.5	4	7	0	2.008	4.151	0.409	User entered value	7.3	SCS CN
S32	0	0.05	11.5	3	0.5	4	7	0	1.944	4.631	0.412	User entered value	5.9	SCS CN
S33	0	0.05	11.93	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	15.1	SCS CN
S36	0	0.05	11.541	3	0.5	4	7	0	2.24	2.389	0.398	User entered value	24.9	SCS CN
S46_2	0	0.05	11.513	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S49_1	0	0.05	11.624	3	0.5	4	7	0	2.124	3.271	0.404	User entered value	17.8	SCS CN
S49_2	0	0.05	11.5	3	0.5	4	7	0	2.088	3.546	0.405	User entered value	5	SCS CN
S49_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S49_4	0	0.05	11.543	3	0.5	4	7	0	2.261	2.229	0.397	User entered value	5	SCS CN
S49_5	0	0.05	11.716	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S49_6	0	0.05	11.5	3	0.5	4	7	0	2.264	2.207	0.397	User entered value	5	SCS CN
S49_8	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S5	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S52_2	0	0.05	11.5	3	0.5	4	7	0	2.199	2.7	0.4	User entered value	5.001	SCS CN
S53	0	0.05	11.5	3	0.5	4	7	0	2.161	2.99	0.402	User entered value	5	SCS CN
S6	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S6_1	0	0.05	12.367	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.2	SCS CN
S6_3	0	0.05	12.239	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN

DRAFT

Table 6B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S6_4	0	0.05	11.509	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S7	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S70_2	0	0.05	11.504	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S75_2	0	0.05	12.11	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	8.2	SCS CN
S76_1	0	0.05	11.623	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	7.6	SCS CN
S8	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S80_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S9	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S90_1	0	0.05	12.035	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S90_2	0	0.05	11.63	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S97_2	0	0.05	11.726	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S99_2	0	0.05	11.942	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.244	SCS CN
R1_1	0	0.05	11.5	3	0.5	4	7	0	2.111	3.37	0.404	User entered value	5	SCS CN
R3_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S98_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R4_1	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	27.172	SCS CN
R4_2	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
R5	0	0.05	12.229	3	0.5	4	7	0	2.154	3.045	0.402	User entered value	5	SCS CN

Table 6C: ARM Subcatchments

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S1	0.2 S	0.411	82.955	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S10	0.2 S	0.143	93.311	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_1	0.2 S	0.982	67.075	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_2	0.2 S	1.108	64.358	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S106	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S11	0.2 S	0.053	97.442	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S112	0.2 S	0.172	92.078	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S117	0.2 S	0.764	72.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S119	0.2 S	0.263	88.363	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S12	0.2 S	1.666	54.548	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S121	0.2 S	0.482	80.59	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S122	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S123_1	0.2 S	0.167	92.274	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S126	0.2 S	0.422	82.568	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_1	0.2 S	0.069	96.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_3	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_4	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S13	0.2 S	0.807	71.254	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S130	0.2 S	2.219	47.407	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135	0.2 S	0.47	80.956	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_2	0.2 S	0.633	75.95	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_4	0.2 S	0.076	96.35	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S138	0.2 S	0.501	79.966	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S14	0.2 S	0.677	74.72	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S141	0.2 S	0.159	92.649	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2	0.2 S	1.7	54.06	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 6C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S2_1	0.2 S	1.622	55.211	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2_3	0.2 S	0.628	76.097	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S23	0.2 S	1.119	64.122	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S25	0.2 S	0.429	82.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26	0.2 S	0.139	93.496	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_1	0.2 S	0.496	80.121	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_2	0.2 S	0.432	82.234	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S28	0.2 S	0.881	69.412	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S30	0.2 S	1.372	59.304	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S32	0.2 S	0.51	79.692	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S33	0.2 S	0.979	67.134	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S36	0.2 S	1.122	64.068	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S46_2	0.2 S	2.758	42.031	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_1	0.2 S	0.278	87.78	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_2	0.2 S	0.44	81.972	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_3	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_4	0.2 S	0.294	87.166	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_5	0.2 S	0.045	97.821	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_6	0.2 S	0.25	88.899	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_8	0.2 S	0.121	94.296	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S5	0.2 S	0.412	82.903	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S52_2	0.2 S	0.193	91.184	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S53	0.2 S	0.547	78.512	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6	0.2 S	0.309	86.616	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_1	0.2 S	2.363	45.842	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_3	0.2 S	1.641	54.929	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 6C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S6_4	0.2 S	1.218	62.146	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S7	0.2 S	0.043	97.919	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S70_2	0.2 S	0.469	81.003	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S75_2	0.2 S	1	66.673	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S76_1	0.2 S	0.82	70.914	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S8	0.2 S	0.327	85.953	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S80_1	0.2 S	0.163	92.473	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S9	0.2 S	0.048	97.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_1	0.2 S	0.19	91.328	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_2	0.2 S	0.651	75.453	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S97_2	0.2 S	0.511	79.665	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S99_2	0.2 S	0.117	94.48	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R1_1	0.2 S	0.812	71.117	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_1	0.2 S	0.272	88.01	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_3	0.2 S	0.158	92.689	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_4	0.2 S	0.578	77.569	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S98_3	0.2 S	0.214	90.344	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R4_1	0.2 S	0.717	73.607	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R4_2	0.2 S	3.561	35.962	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R5	0.2 S	0.651	75.452	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 6D: ARM Subcatchments

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S1	0.1	2017			No	0	0	0	0	6.914	1.972	4.987	0.124	4.393
S10	0.1	2017			No	0	0	0	0	6.914	0.792	6.18	0.059	1.952
S103_1	0.1	2017			No	0	0	0	0	6.914	3.668	3.277	0.069	2.524
S103_2	0.1	2017			No	0	0	0	0	6.914	3.942	3	0.052	1.872
S106	0.1	2017			No	0	0	0	0	6.914	0.239	6.741	0.08	2.486
S11	0.1	2017			No	0	0	0	0	6.914	0.305	6.671	0.043	1.367
S112	0.1	2017			No	0	0	0	0	6.914	0.935	6.036	0.094	3.157
S117	0.1	2017			No	0	0	0	0	6.914	3.121	3.791	0.132	4.21
S119	0.1	2017			No	0	0	0	0	6.914	1.363	5.604	0.074	2.554
S12	0.1	2017			No	0	0	0	0	6.914	4.886	2.071	0.065	2.077
S121	0.1	2017			No	0	0	0	0	6.914	2.234	4.724	0.047	1.678
S122	0.1	2017			No	0	0	0	0	6.914	0.239	6.738	0.006	0.188
S123_1	0.1	2017			No	0	0	0	0	6.914	0.912	6.056	0.907	30.277
S126	0.1	2017			No	0	0	0	0	6.914	2.015	4.945	0.05	1.782
S128_1	0.1	2017			No	0	0	0	0	6.914	0.399	6.576	0.163	5.175
S128_3	0.1	2017			No	0	0	0	0	6.914	0.239	6.739	0.015	0.468
S128_4	0.1	2017			No	0	0	0	0	6.914	0.239	6.739	0.013	0.394
S13	0.1	2017			No	0	0	0	0	6.914	3.236	3.648	0.943	29.903
S130	0.1	2017			No	0	0	0	0	6.914	5.518	1.406	0.061	1.786
S135	0.1	2017			No	0	0	0	0	6.914	2.194	4.763	0.115	4.123
S135_2	0.1	2017			No	0	0	0	0	6.914	2.739	4.215	0.06	2.192
S135_4	0.1	2017			No	0	0	0	0	6.914	0.435	6.541	0.039	1.235
S138	0.1	2017			No	0	0	0	0	6.914	2.303	4.654	0.091	3.26
S14	0.1	2017			No	0	0	0	0	6.914	2.87	4.13	0.929	32.318
S141	0.1	2017			No	0	0	0	0	6.914	0.869	6.103	0.021	0.683
S2	0.1	2017			No	0	0	0	0	6.914	4.931	1.971	1.406	39.94

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Table 6D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S2_1	0.1	2017			No	0	0	0	0	6.914	4.825	2.109	0.022	0.744
S2_3	0.1	2017			No	0	0	0	0	6.914	2.723	4.181	1.226	38.866
S23	0.1	2017			No	0	0	0	0	6.914	3.966	2.976	0.042	1.529
S25	0.1	2017			No	0	0	0	0	6.914	2.039	4.856	0.268	8.048
S26	0.1	2017			No	0	0	0	0	6.914	0.77	6.201	0.092	3.033
S26_1	0.1	2017			No	0	0	0	0	6.914	2.286	4.672	0.048	1.731
S26_2	0.1	2017			No	0	0	0	0	6.914	2.052	4.859	0.304	9.685
S28	0.1	2017			No	0	0	0	0	6.914	3.428	3.572	0.937	31.473
S30	0.1	2017			No	0	0	0	0	6.914	4.438	2.536	0.303	9.87
S32	0.1	2017			No	0	0	0	0	6.914	2.333	4.617	0.253	8.929
S33	0.1	2017			No	0	0	0	0	6.914	3.662	3.226	0.776	22.753
S36	0.1	2017			No	0	0	0	0	6.914	3.971	2.943	0.975	24.469
S46_2	0.1	2017			No	0	0	0	0	6.914	5.952	0.971	0.014	0.33
S49_1	0.1	2017			No	0	0	0	0	6.914	1.429	5.487	0.467	12.563
S49_2	0.1	2017			No	0	0	0	0	6.914	2.081	4.879	0.15	5.343
S49_3	0.1	2017			No	0	0	0	0	6.914	0.239	6.738	0.051	1.575
S49_4	0.1	2017			No	0	0	0	0	6.914	1.499	5.466	0.331	11.509
S49_5	0.1	2017			No	0	0	0	0	6.914	0.26	6.715	0.015	0.468
S49_6	0.1	2017			No	0	0	0	0	6.914	1.301	5.665	0.069	2.382
S49_8	0.1	2017			No	0	0	0	0	6.914	0.676	6.296	0.031	1.006
S5	0.1	2017			No	0	0	0	0	6.914	1.978	4.983	0.147	5.211
S52_2	0.1	2017			No	0	0	0	0	6.914	1.039	5.931	0.04	1.352
S53	0.1	2017			No	0	0	0	0	6.914	2.461	4.495	0.379	13.66
S6	0.1	2017			No	0	0	0	0	6.914	1.561	5.403	0.041	1.427
S6_1	0.1	2017			No	0	0	0	0	6.914	5.648	1.276	0.043	1.196
S6_3	0.1	2017			No	0	0	0	0	6.914	4.851	2.082	0.27	9.241

Table 6D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S6_4	0.1	2017			No	0	0	0	0	6.914	4.162	2.778	0.117	4.191
S7	0.1	2017			No	0	0	0	0	6.914	0.249	6.728	0.023	0.713
S70_2	0.1	2017			No	0	0	0	0	6.914	2.189	4.77	0.372	13.306
S75_2	0.1	2017			No	0	0	0	0	6.914	3.709	3.251	0.144	4.701
S76_1	0.1	2017			No	0	0	0	0	6.914	3.272	3.734	0.538	18.16
S8	0.1	2017			No	0	0	0	0	6.914	1.636	5.327	0.054	1.883
S80_1	0.1	2017			No	0	0	0	0	6.914	0.889	6.081	0.095	3.181
S9	0.1	2017			No	0	0	0	0	6.914	0.28	6.697	0.069	2.165
S90_1	0.1	2017			No	0	0	0	0	6.914	1.022	5.947	0.022	0.75
S90_2	0.1	2017			No	0	0	0	0	6.914	2.792	4.161	0.05	1.809
S97_2	0.1	2017			No	0	0	0	0	6.914	2.336	4.621	0.038	1.349
S99_2	0.1	2017			No	0	0	0	0	6.914	0.655	6.307	0.043	1.392
R1_1	0.1	2017			No	0	0	0	0	6.914	3.251	3.698	0.049	1.781
R3_1	0.1	2017			No	0	0	0	0	6.914	1.403	5.563	0.047	1.607
R3_3	0.1	2017			No	0	0	0	0	6.914	0.864	6.107	0.006	0.215
R3_4	0.1	2017			No	0	0	0	0	6.914	2.564	4.391	0.094	3.397
S98_3	0.1	2017			No	0	0	0	0	6.914	1.136	5.833	0.032	1.081
R4_1	0.1	2017			No	0	0	0	0	6.914	2.989	3.925	0.216	5.338
R4_2	0.1	2017			No	0	0	0	0	6.914	6.383	0.536	0.007	0.103
R5	0.1	2017			No	0	0	0	0	6.914	2.792	4.162	0.179	6.505

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Table 6E: ARM Subcatchments

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S1	0.721	315.069	3688.787	1
S10	0.894	269.666	1423.459	1
S103_1	0.474	377.028	3159.303	1
S103_2	0.434	295.706	2574.745	1
S106	0.975	233.481	1631.88	1
S11	0.965	168.535	969.45	1
S112	0.873	307.634	2332.704	1
S117	0.548	712.861	5180.467	1
S119	0.811	179.431	1969.813	1
S12	0.3	494.459	4707.633	1
S121	0.683	270.8	1476.259	1
S122	0.975	59.644	132.225	1
S123_1	0.876	668.642	22309.393	1
S126	0.715	304.22	1500.539	1
S128_1	0.951	362.657	3683.22	1
S128_3	0.975	88.73	333.025	1
S128_4	0.975	131.285	280.734	1
S13	0.528	895.981	38534.838	1
S130	0.203	622.887	6453.473	1
S135	0.689	370.13	3603.291	1
S135_2	0.61	315.527	2135.183	1
S135_4	0.946	194.92	883.385	1
S138	0.673	345.481	2904.866	1
S14	0.597	796.88	33566.433	1
S141	0.883	100.226	495.075	1
S2	0.285	1627.441	106358.672	1

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Table 6E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S2_1	0.305	157.843	1534.804	1
S2_3	0.605	1284.924	43708.974	1
S23	0.43	289.85	2122.072	1
S25	0.702	572.013	8217.123	1
S26	0.897	226.137	2209.877	1
S26_1	0.676	210.057	1536.428	1
S26_2	0.703	644.649	9327.342	1
S28	0.517	336.748	3040.206	1
S30	0.367	617.351	17821.744	1
S32	0.668	756.561	8203.518	1
S33	0.467	1019.231	35810.985	1
S36	0.426	1284.844	49364.997	1
S46_2	0.14	317.357	1711.653	1
S49_1	0.794	824.311	12680.818	1
S49_2	0.706	327.795	4577.905	1
S49_3	0.975	134.11	1118.726	1
S49_4	0.791	636.595	9031.481	1
S49_5	0.971	88.964	331.036	1
S49_6	0.819	195.824	1823.61	1
S49_8	0.911	121.828	726.955	1
S5	0.721	548.842	4387.004	1
S52_2	0.858	208.657	1007.1	1
S53	0.65	693.413	12557.385	1
S6	0.781	201.685	1127.756	1
S6_1	0.185	349.322	5010.388	1
S6_3	0.301	667.94	19372.264	1

Draft

Table 6E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S6_4	0.402	354.418	6315.075	1
S7	0.973	129.15	502.961	1
S70_2	0.69	717.708	11615.95	1
S75_2	0.47	1002.106	6583.03	1
S76_1	0.54	859.132	21455.902	1
S8	0.771	242.966	1506.778	1
S80_1	0.88	242.097	2340.437	1
S9	0.969	211.337	1535.98	1
S90_1	0.86	153.485	557.903	1
S90_2	0.602	338.375	1784.976	1
S97_2	0.668	294.868	1210.755	1
S99_2	0.912	267.109	928.72	1
R1_1	0.535	234.206	1969.851	1
R3_1	0.805	147.113	1245.434	1
R3_3	0.883	49.68	159.372	1
R3_4	0.635	353.112	3185.744	1
S98_3	0.844	178.953	814.244	1
R4_1	0.568	785.818	8199.973	1
R4_2	0.078	257.642	1939.276	1
R5	0.602	347.858	6416.274	1

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ATTACHMENT 5.4

Proposed PCSWMM Reports

PCSWMM Report

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Proposed

Model ShankPainter_PR_2yr24hr_2024.03.17.inp

Apex Companies, LLC

March 30, 2024

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Summary 1: Options

Name	ShankPainter_PR_2yr24hr_2024.03.17
Flow Units	CFS
Infiltration method	Curve Number
Flow routing method	Dynamic Wave
Link offsets defined by	Depth
Allow ponding	No
Skip steady flow periods	No
Inertial dampening	Full
Define supercritical flow by	Both
Force Main Equation	H-W
Variable time step	On
Adjustment factor (%)	75
Conduit lengthening (s)	0
Minimum surface area (ft²)	0.1
Starting date	Oct-31-2018 12:00:00 AM
Ending date	Nov-2-2018 12:00:00 AM
Duration of simulation (hours)	48
Antecedent dry days (days)	0
Rain interval (h:mm)	0:06
Report time step (h:mm:ss)	00:01:00
Wet time step (h:mm:ss)	00:05:00
Dry time step (h:mm:ss)	00:05:00
Routing time step (s)	0.5
Minimum time step used (s)	0.12
Average time step used (s)	0.5
Minimum conduit slope	0
Ignore rainfall/runoff	No
Ignore snow melt	No
Ignore groundwater	No
Ignore flow routing	No
Ignore water quality	No
Report average results	No

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Summary 2: Model inventory

Name	ShankPainter_PR_2yr24hr_2024.03.17
Raingages	3
Subcatchments	0
Aquifers	0
Snowpacks	0
RDII hydrographs	0
Junction nodes	1966
Outfall nodes	351
Flow divider nodes	0
Storage unit nodes	8
Conduit links	5488
Pump links	2
Orifice links	64
Weir links	3
Outlet links	0
Treatment units	0
Transects	1
Control rules	0
Pollutants	0
Land Uses	0
Control Curves	0
Diversion Curves	0
Pump Curves	3
Rating Curves	0
Shape Curves	0
Storage Curves	17
Tidal Curves	0
Weir Curves	0
Time Series	3
Time Patterns	0

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Summary 3: Model complexity

Name	ShankPainter_PR_2yr24hr_2024.03.17
Subcatchments	n/a
Groundwater	n/a
Aquifers	n/a
Snowpacks	n/a
RDII hydrographs	n/a
Junction nodes	4017
Outfall nodes	351
Flow divider nodes	n/a
Storage unit nodes	36
Conduit links	32838
Pump links	4
Orifice links	256
Weir links	12
Outlet links	n/a
Transect	3
Pollutants	n/a
Land Uses	n/a
Model complexity (total uncertain input parameters)	37517

Summary 4: Node statistics

Name	ShankPainter_PR_2yr24hr_2024.03.17
Max. ground elev. (ft)	81.527
Min. ground elev. (ft)	4.5
Max. invert elev. (ft)	52.558
Min. invert elev. (ft)	-13
Max. depth (ft)	30
Min. depth (ft)	0

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Summary 5: Conduit statistics

Name	ShankPainter_PR_2yr24hr_2024.03.17
Max. roughness	0.4
Min. roughness	0.01
Max. entry loss coef.	0.5
Min. entry loss coef.	0
Max. exit loss coef.	0
Min. exit loss coef.	0
Max. avg. loss coef.	0.5
Min. avg. loss coef.	0
Max. length (ft)	482.605
Min. length (ft)	5.84
Total length (ft)	131014.678
Max. slope (ft/ft)	2.0301
Min. slope (ft/ft)	-0.6074

Summary 6: Conduit Inventory

Name	ShankPainter_PR_2yr24hr_2024.03.17
Open Rectangular (ft)	121870.74
Circular (ft)	9143.938

Summary 7: Pipe inventory

Name	ShankPainter_PR_2yr24hr_2024.03.17
Max. pipe diameter (ft)	2
Min. pipe diameter (ft)	0.833
Total 12” pipe length (ft)	5385.936
Total 15” pipe length (ft)	1553.518
Total 18” pipe length (ft)	1235.844
Total 24” pipe length (ft)	756.63
Total other pipe length (ft)	212.01
Total pipe length (ft)	9143.938

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Summary 8: Flow routing continuity

Name	ShankPainter_PR_2yr24hr_2024.03.17
Dry weather inflow (MG)	0.000
Wet weather inflow (MG)	0.000
Groundwater inflow (MG)	0.000
RDII inflow (MG)	0.000
External inflow (MG)	3.734
External outflow (MG)	0.993
Flooding loss (MG)	0.592
Evaporation loss (MG)	0.000
Exfiltration loss (MG)	0.273
Initial stored volume (MG)	0.002
Final stored volume (MG)	1.878
Continuity error (%)	0.007

Summary 9: Results statistics

Name	ShankPainter_PR_2yr24hr_2024.03.17
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	7.25
Num. nodes surcharged	0
Max. node surcharge duration (hours)	0
Max. node height above crown (ft)	0
Min. node depth below rim (ft)	-0.9
Num. nodes flooded	3
Max. node flooding duration (hours)	48
Max. node flood volume (MG)	0.315
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	65.065
Max. storage percent full (%)	100
Max. outfall flow frequency (%)	43.6
Max. outfall peak flow (cfs)	11.13
Max. outfall total volume (MG)	0.341
Total outfall volume (MG)	0.993
Max. link peak flow (cfs)	14.76
Max. link peak velocity (ft/s)	13.75
Min. link peak velocity (ft/s)	0

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Summary 9: Results statistics (continued...)

Name	ShankPainter_PR_2yr24hr_2024.03.17
Num. conduits surcharged	27
Max. conduit surcharge duration (hours)	44.17
Max. conduit capacity limited duration (hours)	0.81

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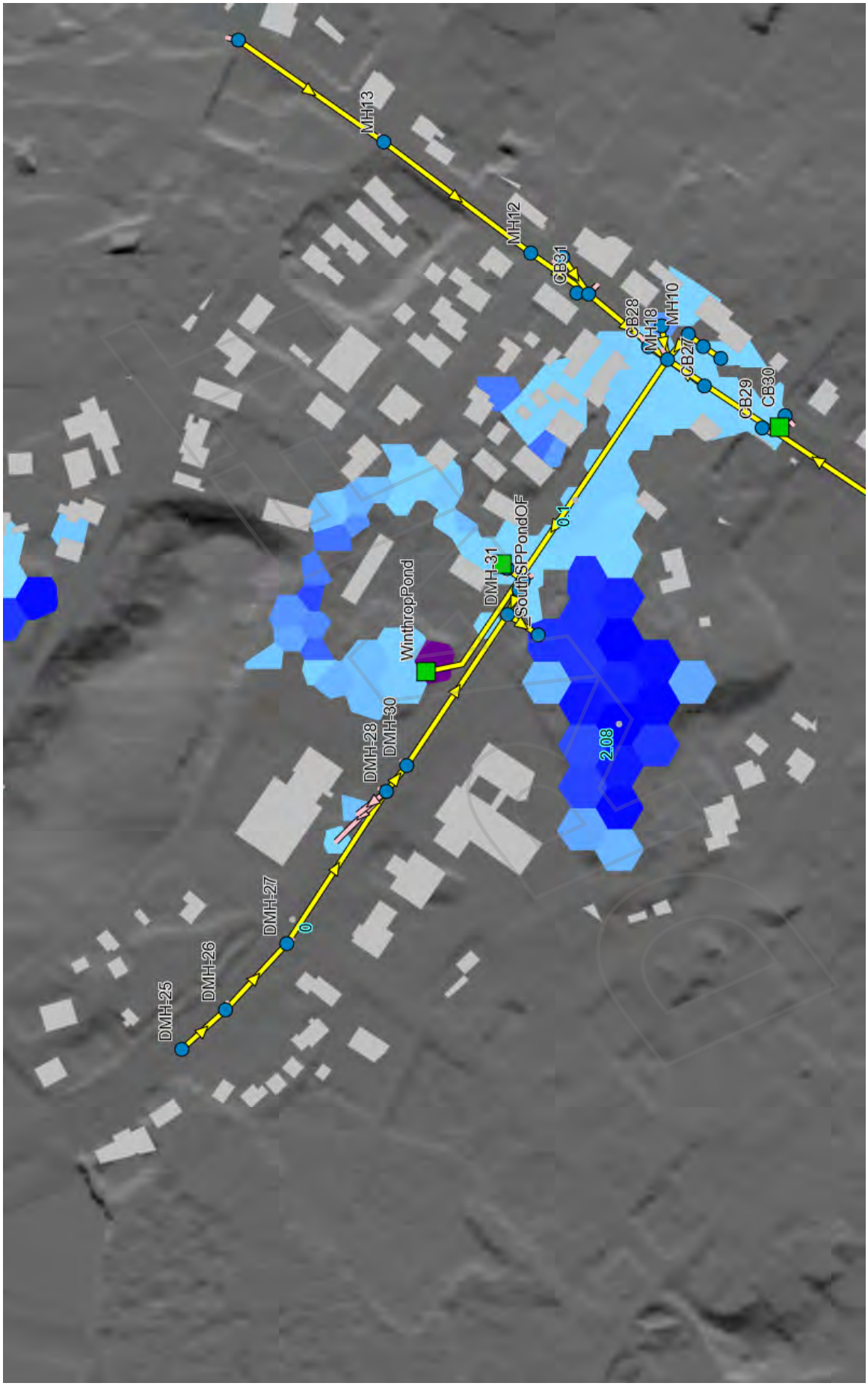


Figure 1: South Shank Painter

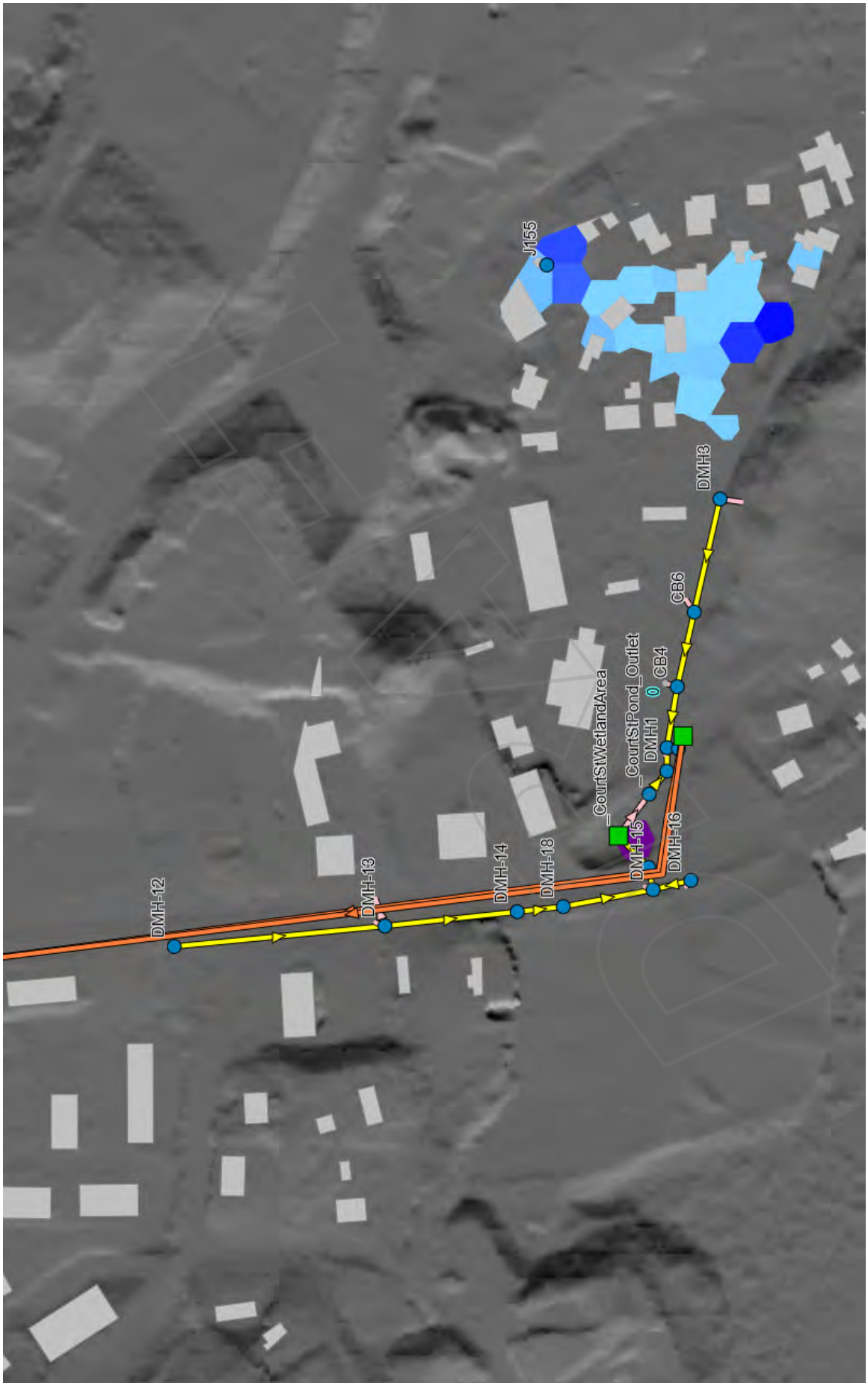


Figure 2: Court Street

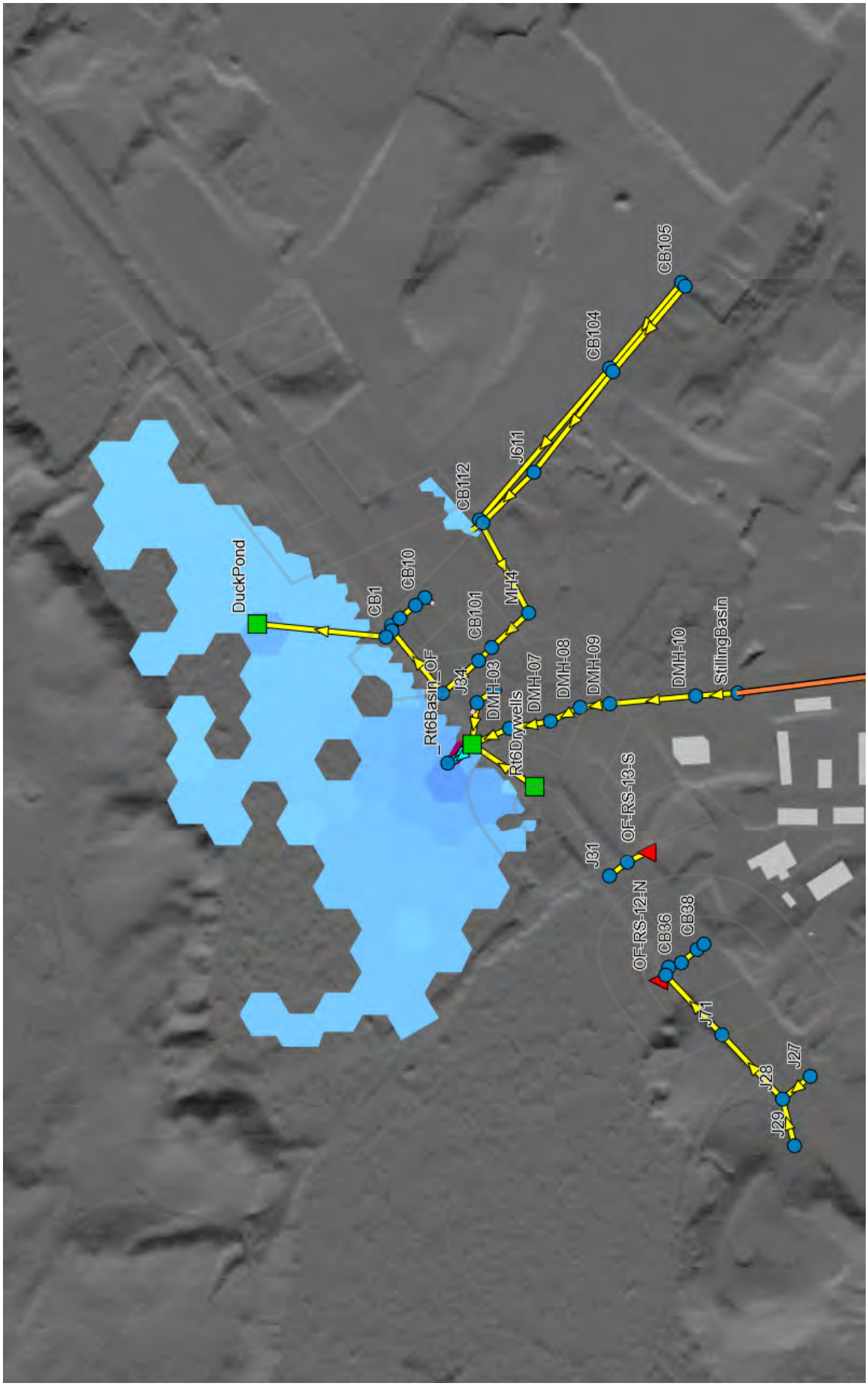


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

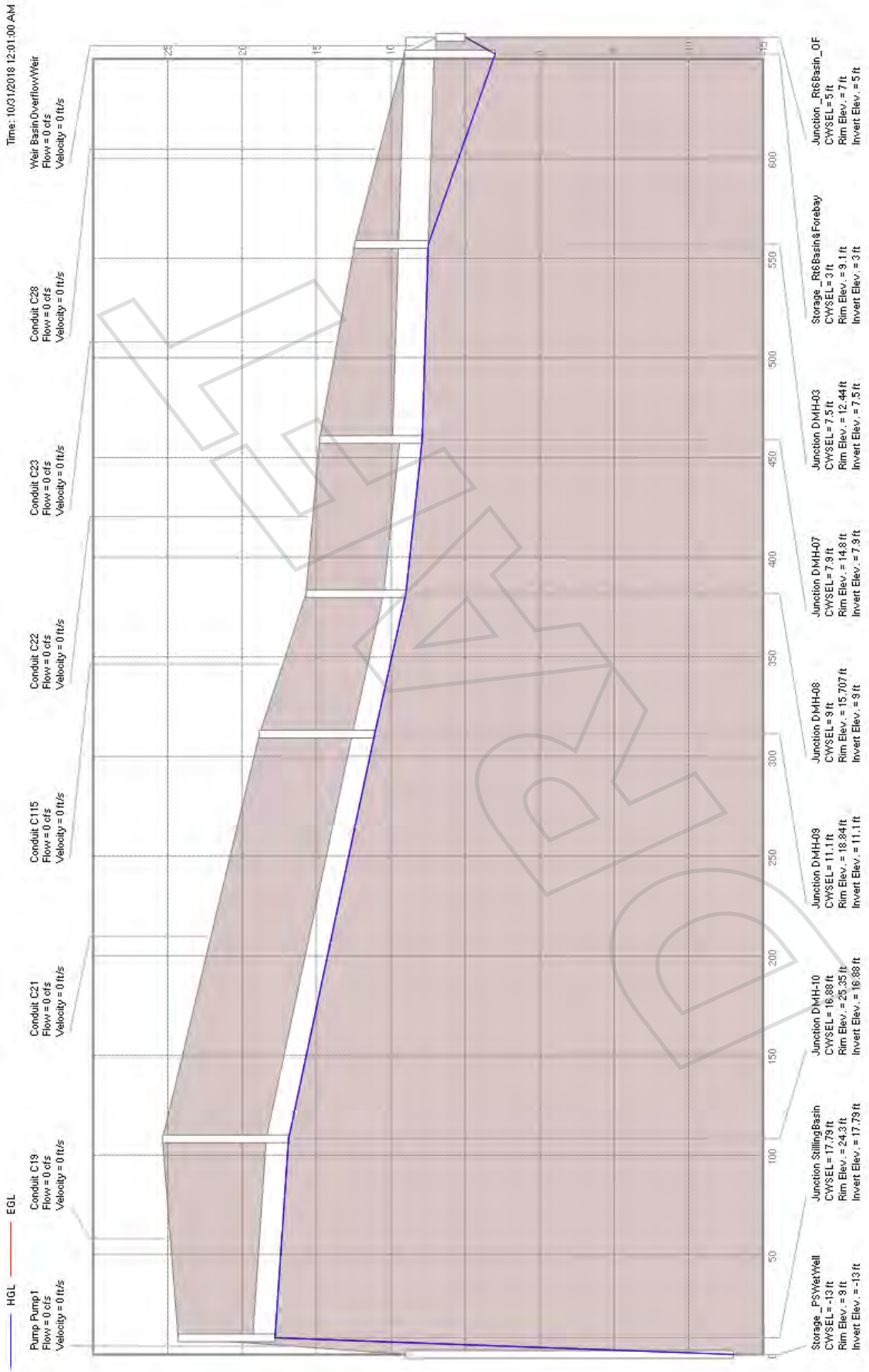


Figure 4: PS to North Outfall

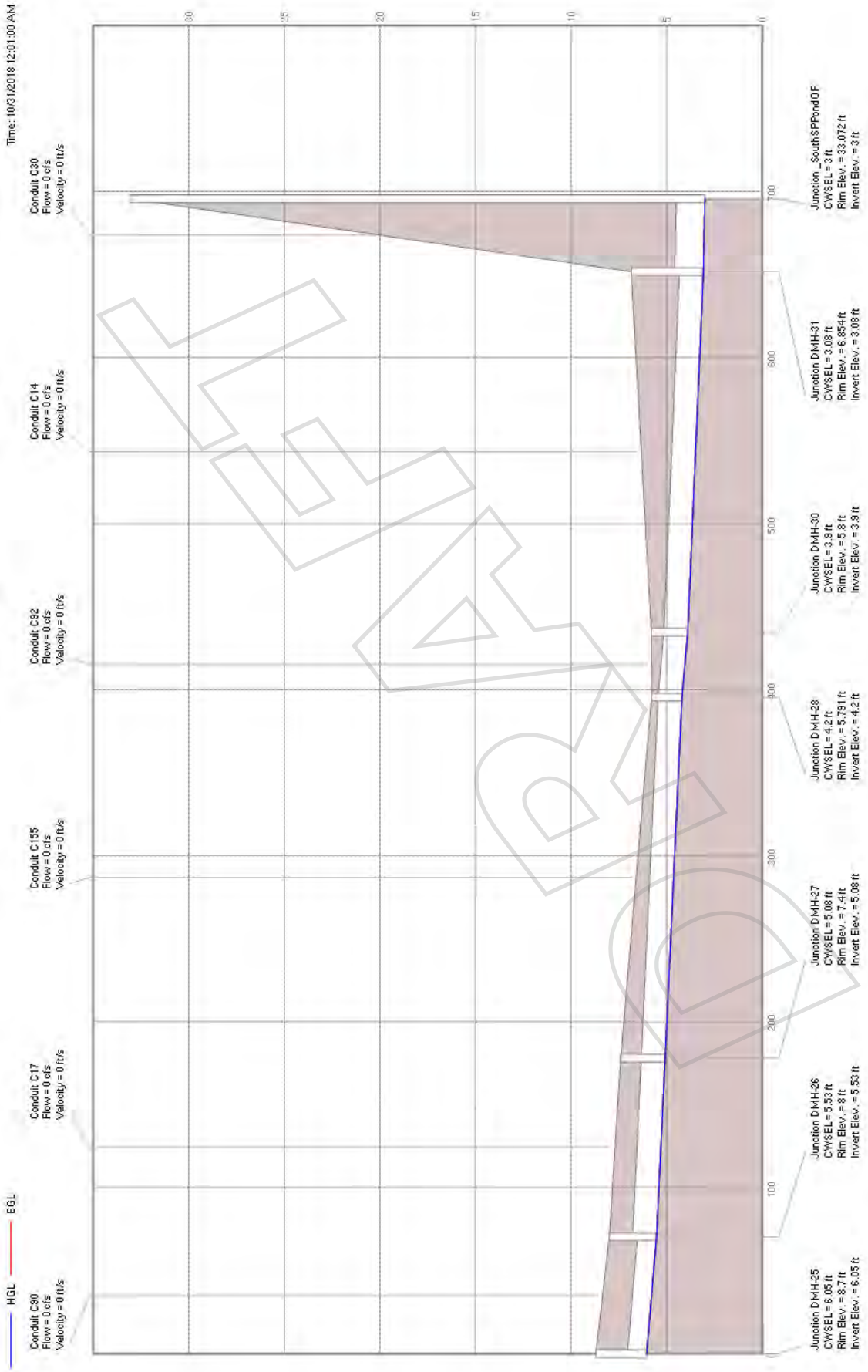


Figure 5: South Shank Painter

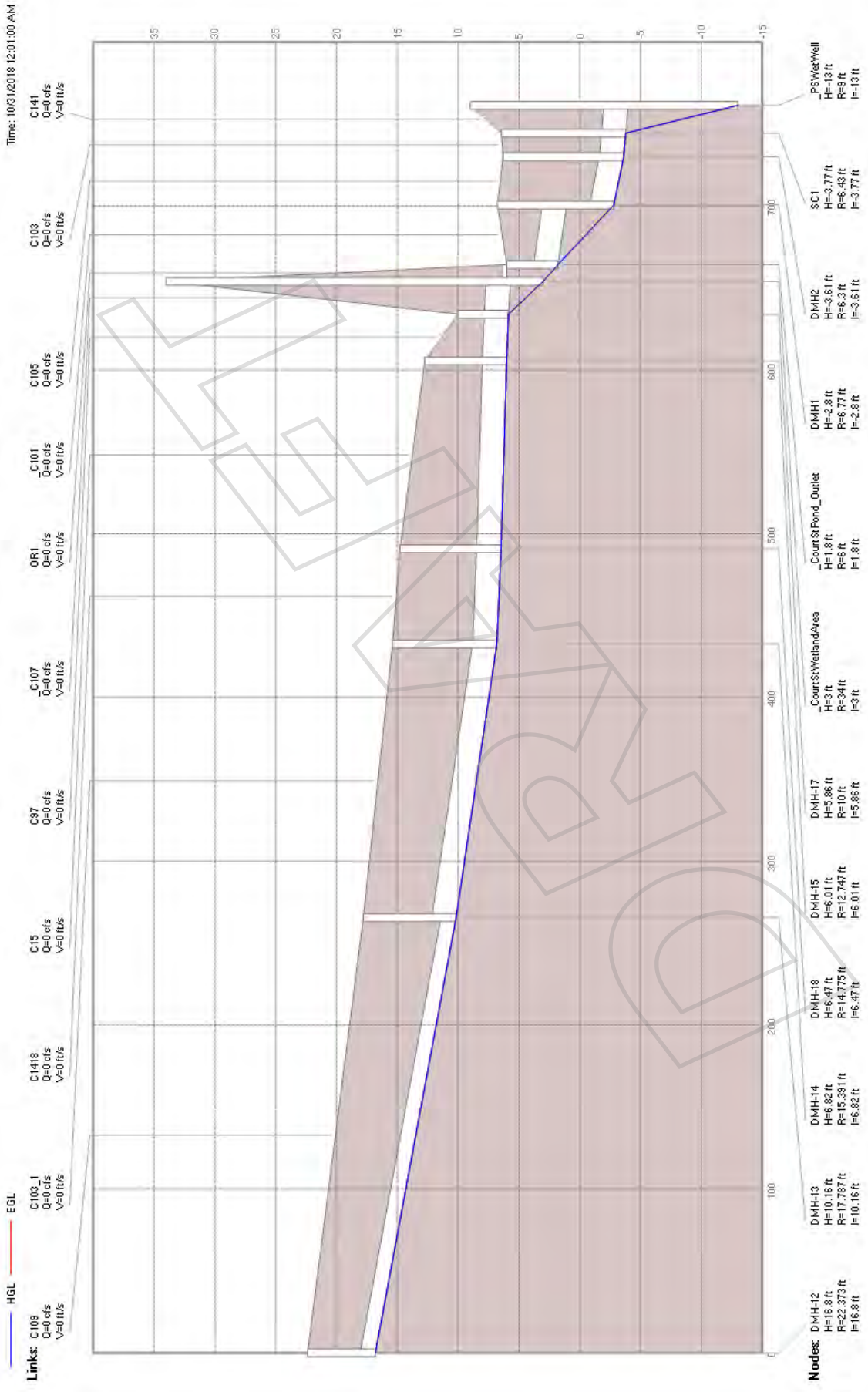


Figure 6: Shank Painter to Court St PS

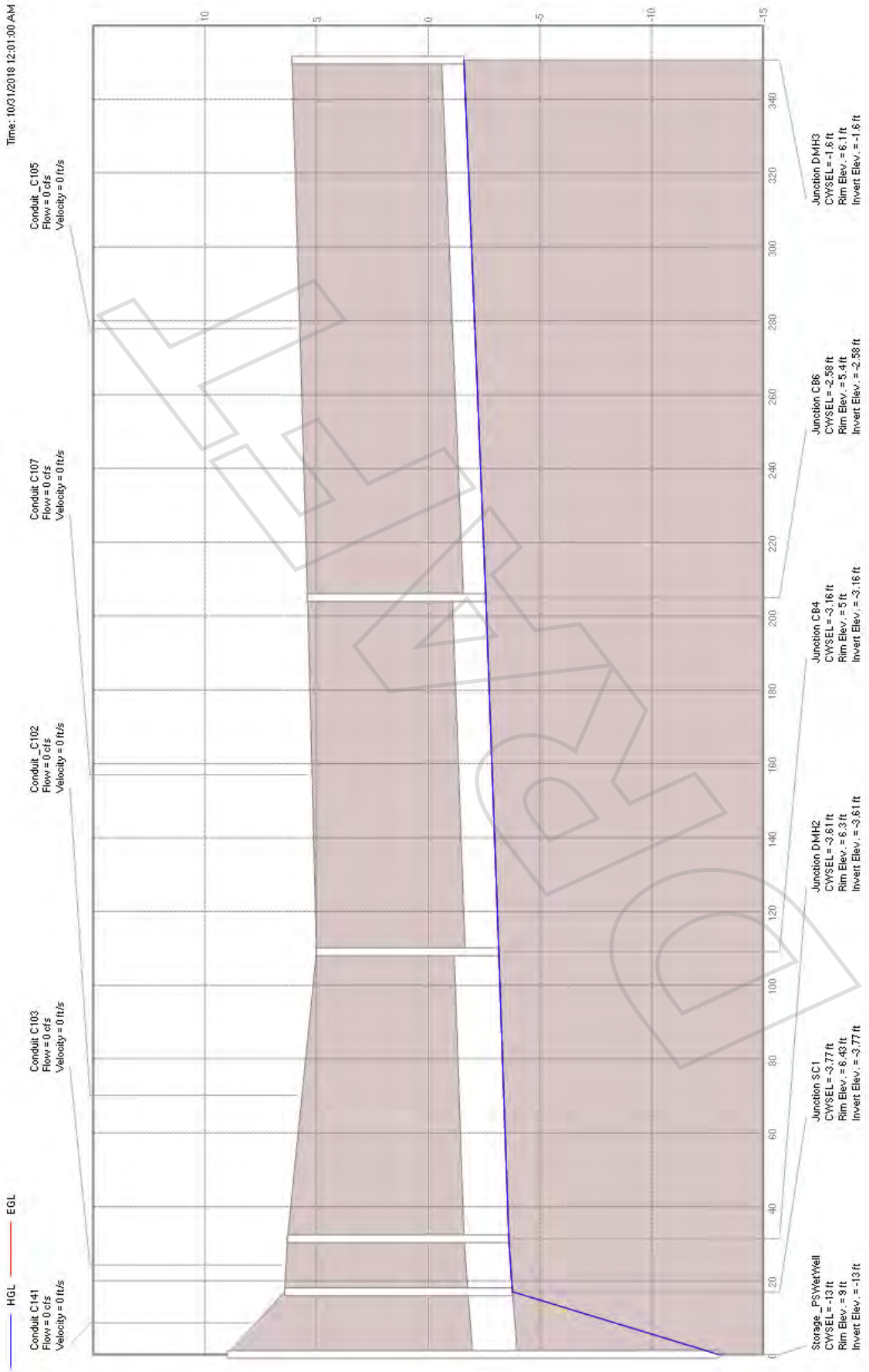


Figure 7: Court Street

Table 1A: Storages

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Evap. Factor (fraction)
_CourtStWetlandArea	1010552.018	2846243.243	Zone4	NO	NO	3	6	3	0	0	0	0
_PSWetWell	1010677.209	2846162.22		NO	NO	-13	9	22	0	0	0	0
_Rt6Basin&Forebay	1010262.67	2847770.047	Connect2D_Direct	NO	NO	3	8	5	0	0	0	0
DuckPond	1010546.203	2848276.711	Connect2D_Direct	NO	NO	4	5	1	0	0	0	0
DW#9	1011400.39	2845161.145		NO	NO	8.15	15.65	7.5	0	0	0	0
Rt6Drywells	1010162.878	2847622.97	Connect2D_Storage	NO	NO	4.07	10.7	6.63	0	0	0	0
SU1	1011236.875	2845492.701		NO	NO	3.84	7.93	4.09	0	0	0	0
WinthropPond	1011108.39	2845583.168	Zone6	NO	NO	1.5	4.5	3	0	0	0	0

Table 1B: Storages

Name	Storage Curve	Coefficient	Exponent	Constant (ft²)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series
_CourtStWetlandArea	TABULAR	1000	0	0	CourtStPond	0	0	0	0	0		
_PSWetWell	TABULAR	1000	0	0	PSWetWell	0	0	0	0	0		
_Rt6Basin&Forebay	TABULAR	1000	0	0	RetentionBasin&Forebay	0	0	0	0	0		
DuckPond	TABULAR	1000	0	0	DuckPond5ft	0	0	0	0	0		
DW#9	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0		
Rt6Drywells	TABULAR	1000	0	0	Rt6Drywells	0	0	0	0	0		
SU1	TABULAR	1000	0	0	Cultec150XLHD	0	0	0	0	0		
WinthropPond	TABULAR	1000	0	0	WinthropPond	0	0	0	0	0		

Table 1C: Storages

Name	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (fraction)	Avg. Depth (ft)	Max. Depth (ft)
_CourtStWetlandArea	1	0						0	0	0	0	2.3	3
_PSWetWell	1	0						0	0	0	0	2.26	7.25
_Rt6Basin&Forebay	1	0						0	1.93	4.74	0.413	0.96	3.39
DuckPond	1	0						0	0	0	0	0.2	0.29
DW#9	1	0						0	0	0	0	5.94	6.94
Rt6Drywells	1	0						0	1.93	4.74	0.413	0.69	3.57
SU1	1	0						0	1.93	4.74	0.413	0.09	1.35
WinthropPond	1	0						0	0	0	0	2.29	3

Table 1D: Storages

Name	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)
_CourtStWetlandArea	6	10/31/2018 12:07 PM	3	0.05	11.94	0.003	0.4	6.986	0	0	28	12.8	11.68
_PSWetWell	-5.75	10/31/2018 12:13 PM	7.24	0	11.06	0	0.333	-0.009	0	0	14.75	48	0
_Rt6Basin&Forebay	6.39	10/31/2018 12:07 PM	3.39	0	14.76	0	0.499	0	0	0	2.71	0	0
DuckPond	4.29	11/01/2018 04:09 AM	0.29	1.64	6.74	0.143	0.487	0.004	0	0	1.21	0	0
DW#9	15.09	10/31/2018 12:05 PM	6.94	0	0.61	0	0.021	2.728	0	0	0.56	0	0
Rt6Drywells	7.64	10/31/2018 12:31 PM	3.57	0.52	0.52	0.014	0.014	-0.006	0	0	3.06	0	0
SU1	5.19	10/31/2018 12:24 PM	1.35	0	1.67	0	0.049	-0.023	0	0	2.74	0	0
WinthropPond	4.5	10/31/2018 12:32 PM	3	1.14	12.43	0.033	0.631	5.308	0	0	0	35.46	6.78

Table 1E: Storages

Name	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)
_CourtStWetlandArea	0.277	0	9.932	76	0	0	0	13.004	100	0	0	0
_PSWetWell	0	-14.75	0.268	0	0	0	0	0	0	8.91	0	0
_Rt6Basin&Forebay	0	0	1.85	12	0	42	42	7.802	49	14.52	0	0
DuckPond	0	0	44.3	12	0	0	0	65.065	18	0	0	0
DW#9	0	0	0.236	78	0	0	0	0.278	92	0.61	0	0
Rt6Drywells	0	0	0.133	10	0	93	93	0.719	51	0.13	0	0
SU1	0	0	0.123	2	0	100	100	1.992	38	0.43	0	0
WinthropPond	0.315	0	28.944	76	0	0	0	38	100	0	0	0

Table 1F: Storages

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_CourtStWetlandArea	0	0	0	1
_PSWetWell	0	0	0	1
_Rt6Basin&Forebay	0	0	0	1
DuckPond	0	0	0	1
DW#9	0	0	0	1
Rt6Drywells	0	0	0	1
SU1	0	0	0	1
WinthropPond	0	0	0	1

Table 2A: Pumps

Name	Inlet Node	Outlet Node	Tag	Pump Curve	Initial Status	Startup Depth (ft)	Shutoff Depth (ft)	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)	Max/Full Flow	Utilized (%)	Start-Ups (num)
Pump1	_PSWetWell	StillingBasin		Constant2000gpm	OFF	4	1	NO	4.46	10/31/2018 11:19 AM	1	4.83	50
Pump2	_PSWetWell	StillingBasin		Constant2000gpm	OFF	5	1	NO	4.46	10/31/2018 11:59 AM	1	0.91	1

Table 2B: Pumps

Name	Min. Flow (cfs)	Avg. Flow (cfs)	Total Vol. (MG)	Power Usage	Below Curve (%)	Above Curve (%)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
Pump1	0	4.46	0.278	24.55	0	0	0	0	0	344.956	0	1
Pump2	0	4.46	0.052	4.29	0	0	0	0	0	347.306	0	1

Table 3A: Junctions

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
_CourtStPond_Outlet	1010604.363	2846204.755	Connect2D_MH	NO	NO	1.8	6	4.2	0	30	0	0
_Rt6Basin_OF	1010218.269	2847827.623	Zone3	NO	NO	5	5	0	0	0	0	0
_SouthSPPondOF	1011152.274	2845449.417	Zone5	NO	NO	3	33	30	0	0	0	0
CB1	1010543.4	2847960.354	Connect2D_MH	NO	NO	5.58	11.33	5.75	0	30	0	0
CB10	1010608.483	2847881.463	Connect2D_MH	NO	NO	6.36	11.16	4.8	0	30	0	0
CB101	1010490.895	2847724.25	Connect2D_MH	NO	NO	6.58	12.18	5.6	0	30	0	0
CB104	1011149.472	2847446.085		NO	NO	11.53	15.969	4.439	0	50	0	0
CB105	1011351.247	2847276.782		NO	NO	17.62	19.674	2.054	0	50	0	0
CB112	1010791.703	2847752.789		NO	NO	8.98	12.818	3.838	0	50	0	0
CB2	1010559.723	2847940.655	Connect2D_MH	NO	NO	6.08	11.13	5.05	0	30	0	0
CB27	1011449.616	2845250.949	Connect2D_MH	NO	NO	8	10.039	2.039	0	30	0	0

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Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
CB28	1011496.541	2845317.631	Connect2D_MH	NO	NO	5.5	9.25	3.75	0	30	0	0
CB29	1011399.511	2845181.95	Connect2D_MH	NO	NO	11.88	14.18	2.3	0	30	0	0
CB3	1010590.535	2847903.6	Connect2D_MH	NO	NO	6.13	11.23	5.1	0	30	0	0
CB30	1011414.192	2845154.644	Connect2D_MH	NO	NO	12.37	15.17	2.8	0	30	0	0
CB31	1011560.681	2845403.096	Connect2D_MH	NO	NO	8.85	11.7	2.85	0	30	0	0
CB32	1011603.491	2845420.161	Connect2D_MH	NO	NO	8.21	10.91	2.7	0	30	0	0
CB33	1011521.313	2845302.115	Connect2D_MH	NO	NO	5.55	9.05	3.5	0	30	0	0
CB35	1009736.842	2847306.934		NO	NO	6.76	12.09	5.33	0	50	0	0
CB36	1009747.672	2847276.924		NO	NO	7	12.09	5.09	0	50	0	0
CB37	1009778.85	2847240.103		NO	NO	7.23	12.04	4.81	0	50	0	0
CB38	1009791.611	2847223.915		NO	NO	7.85	12.04	4.19	0	50	0	0
CB4	1010739.258	2846169.508	Connect2D_MHs	NO	NO	-3.16	5	8.16	0	30	0	0
CB6	1010832.831	2846148.26	Connect2D_MHs	NO	NO	-2.58	5.4	7.98	0	30	0	0
DMH-03	1010300.442	2847682.232	Connect2D_MH	NO	NO	7.5	12.44	4.94	0	30	0	0
DMH-06	1010391.083	2847717.435	Connect2D_MH	NO	NO	9.1	13.37	4.27	0	30	0	0
DMH-07	1010317.02	2847585.758	Connect2D_MH	NO	NO	7.9	14.8	6.9	0	30	0	0
DMH-08	1010349.802	2847515.652	Connect2D_MH	NO	NO	9	15.707	6.707	0	30	0	0
DMH-09	1010358.138	2847445.696	Connect2D_MH	NO	NO	11.1	18.84	7.74	0	30	0	0
DMH1	1010633.219	2846182.484		NO	NO	-2.8	6.77	9.57	0	0	0	0
DMH-10	1010376.899	2847243.495	Connect2D_MH	NO	NO	16.88	25.35	8.47	0	30	0	0
DMH-12	1010413.132	2846800.679	Connect2D_SPCourt	NO	NO	16.8	22.373	5.573	0	30	0	0
DMH-13	1010438.795	2846536.234	Connect2D_SPCourt	NO	NO	10.16	17.456	7.296	0	30	0	0
DMH-14	1010456.768	2846370.239	Connect2D_SPCourt	NO	NO	6.82	15.391	8.571	0	30	0	0
DMH-15	1010484.409	2846199.833	Connect2D_SPCourt	NO	NO	6.01	12.747	6.737	0	30	0	0
DMH-16	1010496.227	2846152.386	Connect2D_SPCourt	NO	NO	6.4	11.736	5.336	0	30	0	0
DMH-17	1010512.398	2846205.536	Zone4	NO	NO	5.86	10	4.14	0	30	0	0

Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
DMH-18	1010463.221	2846312.494	Connect2D_SPCourt	NO	NO	6.47	14.775	8.305	0	30	0	0
DMH2	1010662.63	2846182.442	Connect2D_MHs	NO	NO	-3.61	6.3	9.91	0	30	0	0
DMH-25	1010657.414	2845874.873	Connect2D_MHs	NO	NO	6.05	8.7	2.65	0	30	0	0
DMH-26	1010704.509	2845822.687	Connect2D_MHs	NO	NO	5.53	8	2.47	0	30	0	0
DMH-27	1010783.602	2845749.536	Connect2D_MHs	NO	NO	5.08	7.4	2.32	0	30	0	0
DMH-28	1010965.439	2845630.575	Connect2D_MHs	NO	NO	4.2	5.56	1.36	0	30	0	0
DMH3	1010974.762	2846115.859	Connect2D_MHs	NO	NO	-1.6	6.1	7.7	0	30	0	0
DMH-30	1010996.302	2845606.408	Connect2D_MHs	NO	NO	3.9	5.8	1.9	0	30	0	0
DMH-31	1011176.719	2845485.848	Connect2D_MHs	NO	NO	3.08	6.854	3.774	0	30	0	0
DMH-32	1011217.088	2845467.438	Connect2D_MHs	NO	NO	4.48	6.93	2.45	0	30	0	0
DMH-32_Weir	1011206.384	2845472.32		NO	NO	4.416	6.91	2.494	0	0	0	0
J1	1006841.74	2845465.493		NO	NO	27.4	32.9	5.5	0	50	0	0
J10	1008672.424	2846345.08		NO	NO	31	36.6	5.6	0	50	0	0
J11	1005923.53	2844777.21		NO	NO	21	26.115	5.115	0	50	0	0
J1145	1010743.392	2846184.348	2D_label	NO	NO	5.012	35.012	30	0	0	0	0
J12	1005617.671	2844526.538		NO	NO	16.5	21.2	4.7	0	50	0	0
J13	1005898.8	2844802.636		NO	NO	20.7	25.178	4.478	0	50	0	0
J1334	1010812.392	2845742.688	2D_label	NO	NO	6.915	36.915	30	0	0	0	0
J14	1007660.717	2845841.779		NO	NO	33	38.2	5.2	0	50	0	0
J15	1007693.105	2845773.999		NO	NO	33.2	38.2	5	0	50	0	0
J155	1011268.42	2846333.211	Connect2D_Direct	NO	NO	7.185	7.185	0	0	0	0	0
J1574	1011313.392	2845404.948	2D_label	NO	NO	7.865	37.865	30	0	0	0	0
J16	1008017.631	2846022.698		NO	NO	35	40.6	5.6	0	50	0	0
J17	1008052.712	2845956.117		NO	NO	35.6	40.617	5.017	0	50	0	0
J18	1005326.069	2844318.463		NO	NO	13.74	17.97	4.23	0	50	0	0
J2	1009033.294	2846722.781		NO	NO	21.4	27.8	6.4	0	50	0	0

PRELIMINARY

Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
J20	1005571.622	2844576.409		NO	NO	16	21.2	5.2	0	50	0	0
J22	1005435.367	2844345.713		NO	NO	14.5	19	4.5	0	50	0	0
J23	1005396.081	2844465.056		NO	NO	8	13.349	5.349	0	50	0	0
J25	1007203.876	2845643.62		NO	NO	30.5	35.3	4.8	0	50	0	0
J26	1007233.433	2845579.973		NO	NO	30.1	35.3	5.2	0	50	0	0
J27	1009479.713	2846973.226		NO	NO	13	18	5	0	50	0	0
J28	1009425.906	2847038.355		NO	NO	13.18	18.9	5.72	0	50	0	0
J29	1009316.153	2847010.384		NO	NO	13.55	21.71	8.16	0	50	0	0
J3	1006870.603	2845395.681		NO	NO	27.7	32.743	5.043	0	50	0	0
J30	1009984.72	2847404.505	Connect2D_MH	NO	NO	4.8	9.3	4.5	0	30	0	0
J31	1009952.378	2847446.349	Connect2D_MH	NO	NO	5.1	9.4	4.3	0	30	0	0
J32	1009718.364	2847313.955		NO	NO	5.5	9.8	4.3	0	50	0	0
J34	1010360.502	2847758.742	Connect2D_MH	NO	NO	7.3	11.25	3.95	0	30	0	0
J4	1006494.893	2845267.078		NO	NO	25.7	30.676	4.976	0	50	0	0
J428	1011045.896	2845352.789	2D_label	NO	NO	2.588	32.588	30	0	0	0	0
J445	1011141.216	2847438.472		NO	NO	15.852	15.852	0	0	0	0	0
J5	1006199.682	2845072.656		NO	NO	23.5	28.576	5.076	0	50	0	0
J564	1010784.775	2847744.961		NO	NO	12.788	12.788	0	0	0	0	0
J6	1009085.26	2846666.103		NO	NO	22	27.428	5.428	0	50	0	0
J611	1010904.043	2847624.504		NO	NO	13.624	13.624	0	0	0	0	0
J66	1011342.74	2847268.156		NO	NO	19.557	19.557	0	0	0	0	0
J7	1006533.642	2845207.831		NO	NO	24	30.512	6.512	0	50	0	0
J71	1009577.703	2847181.403		NO	NO	9.194	14.177	4.983	0	30	0	0
J8	1006239.797	2845014.495		NO	NO	22.8	28.379	5.579	0	50	0	0
J9	1008626.945	2846408.03		NO	NO	32	36.8	4.8	0	50	0	0
MH1	1010530.644	2847959.58	Connect2D_MH	NO	NO	4.73	10.954	6.224	0	30	0	0

Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
MH10	1011511.543	2845270.131	Connect2D_MH	NO	NO	8.24	10.04	1.8	0	30	0	0
MH11	1011559.458	2845389.196	Connect2D_MH	NO	NO	8	11.188	3.188	0	30	0	0
MH12	1011608.36	2845458.27	Connect2D_MH	NO	NO	12	15.157	3.157	0	30	0	0
MH13	1011741.006	2845633.705	Connect2D_MH	NO	NO	24	28.74	4.74	0	30	0	0
MH14	1011862.65	2845807.307	Connect2D_MH	NO	NO	31	35.203	4.203	0	30	0	0
MH15	1011240.734	2844935.933	Connect2D_MH	NO	NO	25	30.512	5.512	0	30	0	0
MH16	1011171.126	2844842.863	Connect2D_MH	NO	NO	25.5	30.676	5.176	0	30	0	0
MH17	1011090.371	2844735.468	Connect2D_MH	NO	NO	28.44	32.448	4.008	0	30	0	0
MH18	1011481.215	2845295.06	Connect2D_MH	NO	NO	5.3	8.957	3.657	0	30	0	0
MH2	1010382.993	2847839.795	Connect2D_MH	NO	NO	5.58	11.867	6.287	0	30	0	0
MH3	1010459.751	2847754.847	Connect2D_MH	NO	NO	6.08	12.069	5.989	0	30	0	0
MH4	1010572.351	2847637.139	Connect2D_MH	NO	NO	7.83	12.009	4.179	0	30	0	0
MH8	1011482.438	2845231.488	Connect2D_MH	NO	NO	8.21	10.51	2.3	0	30	0	0
MH9	1011496.673	2845252.412	Connect2D_MH	NO	NO	8.1	10.1	2	0	30	0	0
OF-SP-1-WJ	1010515.721	2847973.034	Zone2	NO	NO	4.67	4.67	0	0	0	0	0
SC1	1010661.294	2846168.131		NO	NO	-3.77	6.43	10.2	0	0	0	0
SC-1	1011231.654	2845486.414	Connect2D_MHs	NO	NO	4.38	6.9	2.52	0	30	0	0
StillingBasin	1010383.704	2847143.951	Connect2D_MH	NO	NO	17.79	24.3	6.51	0	30	0	0

Table 3B: Junctions

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
_CourtStPond_Outlet			1	0						0	0	0	1.8
_Rt6Basin_OF			1	0						0	0.09	0.51	5.51
_SouthSPPondOF			1	0						0	1.21	1.67	4.67
CB1			1	0						0	0.02	0.34	5.92
CB10			1	0						0	0	0.16	6.52
CB101			1	0						0	0.1	2.01	8.59
CB104			1	0						0	0.15	4.58	16.11
CB105			1	0						0	0.06	1.42	19.04
CB112			1	0						0	0.13	3.88	12.86
CB2			1	0						0	0.03	0.44	6.52
CB27			1	0						0	0.01	0.13	8.13
CB28			1	0						0	0.05	2.34	7.84
CB29			1	0						0	2.56	3.2	15.08
CB3			1	0						0	0.01	0.39	6.52
CB30			1	0						0	2.13	2.73	15.1
CB31			1	0						0	0	0.56	9.41
CB32			1	0						0	0.04	1.24	9.45
CB33			1	0						0	0.15	3.99	9.54
CB35			1	0						0	0.02	0.2	6.96
CB36			1	0						0	0.03	0.35	7.35
CB37			1	0						0	0.03	0.32	7.55
CB38			1	0						0	0.02	0.2	8.05
CB4			1	0						0	0.07	1.24	-1.92
CB6			1	0						0	0.01	0.68	-1.9
DMH-03			1	0						0	0.09	1.57	9.07
DMH-06			1	0						0	0	0	9.1

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Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
DMH-07			1	0						0	0.09	1.63	9.53
DMH-08			1	0						0	0.06	1.32	10.32
DMH-09			1	0						0	0.05	0.9	12
DMH1			1	0						0	0	0.39	-2.41
DMH-10			1	0						0	0.05	0.84	17.72
DMH-12			1	0						0	0.04	0.53	17.33
DMH-13			1	0						0	0.06	0.74	10.9
DMH-14			1	0						0	0.09	1.41	8.23
DMH-15			1	0						0	0.09	1.37	7.38
DMH-16			1	0						0	0.01	0.98	7.38
DMH-17			1	0						0	0.16	1.21	7.07
DMH-18			1	0						0	0.1	1.42	7.89
DMH2			1	0						0	0.07	1.2	-2.41
DMH-25			1	0						0	0	0.58	6.63
DMH-26			1	0						0	0.01	1.1	6.63
DMH-27			1	0						0	0.06	1.55	6.63
DMH-28			1	0						0	0.34	1.62	5.82
DMH3			1	0						0	0	0	-1.6
DMH-30			1	0						0	0.55	1.53	5.43
DMH-31			1	0						0	1.15	1.59	4.67
DMH-32			1	0						0	0.06	0.71	5.19
DMH-32_Weir			1	0						0	0	0.16	4.57
J1			1	0						0	0.02	0.25	27.65
J10			1	0						0	0.01	0.13	31.13
J11			1	0						0	0.03	0.43	21.43
J1145			1	0						0	0	0	5.01

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Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
J12			1	0						0	0.04	0.45	16.95
J13			1	0						0	0.03	0.49	21.19
J1334			1	0						0	0	0	6.92
J14			1	0						0	0.02	0.19	33.19
J15			1	0						0	0.03	0.38	33.58
J155			1	0						0	0.35	0.47	7.66
J1574			1	0						0	0	0.1	7.97
J16			1	0						0	0.01	0.15	35.15
J17			1	0						0	0.02	0.22	35.82
J18			1	0						0	0.02	0.23	13.97
J2			1	0						0	0.02	0.25	21.65
J20			1	0						0	0.03	0.37	16.37
J22			1	0						0	0.01	0.18	14.68
J23			1	0						0	0.03	0.47	8.47
J25			1	0						0	0.02	0.3	30.8
J26			1	0						0	0.03	0.3	30.4
J27			1	0						0	0.19	0.6	13.6
J28			1	0						0	0.04	0.39	13.57
J29			1	0						0	0.04	0.67	14.22
J3			1	0						0	0.02	0.3	28
J30			1	0						0	0.05	0.8	5.6
J31			1	0						0	0.03	0.57	5.67
J32			1	0						0	0.04	0.46	5.96
J34			1	0						0	0	0	7.3
J4			1	0						0	0.02	0.22	25.92
J428			1	0						0	1.5	2.08	4.67

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Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
J445			1	0						0	0	0.04	15.9
J5			1	0						0	0.01	0.05	23.55
J564			1	0						0	0.01	0.09	12.88
J6			1	0						0	0.03	0.41	22.41
J611			1	0						0	0.01	0.1	13.73
J66			1	0						0	0	0	19.56
J7			1	0						0	0.01	0.18	24.18
J71			1	0						0	0.04	0.38	9.58
J8			1	0						0	0.02	0.18	22.98
J9			1	0						0	0	0	32
MH1			1	0						0	0.11	0.96	5.69
MH10			1	0						0	0	0.03	8.27
MH11			1	0						0	0.05	1.41	9.41
MH12			1	0						0	0.04	0.43	12.43
MH13			1	0						0	0.03	0.3	24.3
MH14			1	0						0	0.01	0.19	31.19
MH15			1	0						0	0.03	0.32	25.32
MH16			1	0						0	0.05	0.55	26.05
MH17			1	0						0	0.02	0.17	28.61
MH18			1	0						0	0.12	2.54	7.84
MH2			1	0						0	0.11	1.22	6.8
MH3			1	0						0	0.11	1.43	7.51
MH4			1	0						0	0.12	3.25	11.08
MH8			1	0						0	0.03	0.08	8.29
MH9			1	0						0	0.12	0.19	8.29
OF-SP-1-WJ			1	0						0	0.07	0.76	5.43

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Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
SC1			1	0						0	0.06	1.05	-2.72
SC-1			1	0						0	0.07	0.81	5.19
StillingBasin			1	0						0	0.04	1.18	18.97

Table 3C: Junctions

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
_CourtStPond_Outlet	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	4.2	0	0	0
_Rt6Basin_OF	10/31/2018 12:11 PM	0.51	0	13.82	0	0.302	1.723	0	0	1.49	0	0	0
_SouthSPPondOF	11/01/2018 23:59 PM	1.67	0	7.04	0	0.197	15.855	0	0	28.402	0	0	0
CB1	10/31/2018 12:05 PM	0.34	0	1.57	0	0.044	-0.002	0	0	5.41	0	0	0
CB10	10/31/2018 12:05 PM	0.16	0	0	0	0	0.117	0	0	4.64	0	0	0
CB101	10/31/2018 12:22 PM	2	0	4.54	0	0.3	-0.001	0	0	3.59	0	0	0
CB104	10/31/2018 12:25 PM	4.58	0.86	4.09	0.044	0.221	-0.404	0	0	-0.141	0	0	0
CB105	10/31/2018 12:26 PM	1.42	3.45	3.45	0.177	0.177	0.036	0	0	0.634	0	0	0
CB112	10/31/2018 12:22 PM	3.88	0	3.09	0	0.217	0.013	0	0	-0.042	0	0	0
CB2	10/31/2018 12:05 PM	0.44	1.58	1.58	0.044	0.044	0	0	0	4.61	0	0	0
CB27	10/31/2018 12:05 PM	0.13	0.21	0.25	0.007	0.008	-0.011	0	0	1.909	0	0	0
CB28	10/31/2018 12:08 PM	2.34	0.18	0.18	0.005	0.005	-0.005	0	0	1.41	0	0	0
CB29	10/31/2018 12:05 PM	3.2	2.29	2.89	0.069	0.087	0.142	0	0	-0.9	0	0	0
CB3	10/31/2018 12:05 PM	0.39	0	0.02	0	0	0.012	0	0	4.71	0	0	0
CB30	10/31/2018 12:05 PM	2.73	0.61	0.61	0.019	0.019	0.421	0	0	0.07	0	0	0
CB31	10/31/2018 12:06 PM	0.56	0	0.04	0	0	0.065	0	0	2.29	0	0	0
CB32	10/31/2018 12:06 PM	1.24	0.95	0.95	0.026	0.026	0.004	0	0	1.46	0	0	0

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
CB33	10/31/2018 12:05 PM	3.99	12.35	12.35	0.35	0.354	0.003	0	0	-0.49	0	0	0
CB35	10/31/2018 12:05 PM	0.2	0	0.74	0	0.029	0.001	0	0	5.13	0	0	0
CB36	10/31/2018 12:05 PM	0.35	0.28	0.74	0.009	0.029	-0.005	0	0	4.74	0	0	0
CB37	10/31/2018 12:10 PM	0.32	0	0.47	0	0.02	0.008	0	0	4.49	0	0	0
CB38	10/31/2018 12:10 PM	0.2	0.47	0.47	0.02	0.02	-0.001	0	0	3.99	0	0	0
CB4	10/31/2018 12:05 PM	1.24	11.16	11.16	0.333	0.333	-0.001	0	0	6.92	0	0	0
CB6	10/31/2018 12:05 PM	0.66	0	0.14	0	0.001	0.098	0	0	7.3	0	0	0
DMH-03	10/31/2018 12:05 PM	1.57	1.19	15.01	0.033	0.498	0.062	0	0	3.37	0	0	0
DMH-06	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	4.27	0	0	0
DMH-07	10/31/2018 12:05 PM	1.63	3.41	13.59	0.096	0.465	-0.143	0	0	5.27	0	0	0
DMH-08	10/31/2018 12:00 PM	1.29	0	10.76	0	0.369	-0.033	0	0	5.387	0	0	0
DMH-09	10/31/2018 12:00 PM	0.86	0	10.99	0	0.37	0.368	0	0	6.84	0	0	0
DMH1	10/31/2018 12:06 PM	0.39	0	0.02	0	0	0.029	0	0	9.18	0	0	0
DMH-10	10/31/2018 12:00 PM	0.77	1.3	11.46	0.038	0.37	-0.075	0	0	7.63	0	0	0
DMH-12	10/31/2018 12:15 PM	0.53	4.59	4.59	0.164	0.164	0.005	0	0	5.043	0	0	0
DMH-13	10/31/2018 12:05 PM	0.74	6.94	10.53	0.191	0.356	-0.001	0	0	6.887	0	0	0
DMH-14	10/31/2018 12:05 PM	1.4	1.02	11.52	0.029	0.384	-0.001	0	0	7.161	0	0	0
DMH-15	10/31/2018 12:06 PM	1.37	0	11.91	0	0.397	0	0	0	5.367	0	0	0
DMH-16	10/31/2018 12:06 PM	0.98	0	0.02	0	0	0.007	0	0	4.356	0	0	0
DMH-17	10/31/2018 12:06 PM	1.21	0	11.9	0	0.397	0.011	0	0	2.93	0	0	0
DMH-18	10/31/2018 12:05 PM	1.42	0.44	11.91	0.013	0.397	0	0	0	6.885	0	0	0
DMH2	10/31/2018 12:06 PM	1.2	0	11.07	0	0.333	0	0	0	8.71	0	0	0
DMH-25	10/31/2018 12:07 PM	0.58	0	0.11	0	0	0.707	0	0	2.07	0	0	0
DMH-26	10/31/2018 12:06 PM	1.1	0	0.36	0	0.001	-0.064	0	0	1.37	0	0	0
DMH-27	10/31/2018 12:06 PM	1.53	4.71	4.71	0.129	0.13	-0.012	0	0	0.77	0	0	0
DMH-28	10/31/2018 12:07 PM	1.62	2	6.29	0.057	0.188	0.196	0	0	-0.029	0	0	0

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
DMH3	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	7.7	0	0	0
DMH-30	10/31/2018 12:07 PM	1.53	0.09	5.78	0.003	0.189	0.392	0	0	0.37	0	0	0
DMH-31	11/01/2018 23:53 PM	1.59	0	5.94	0	0.194	0.892	0	0	2.184	0	0	0
DMH-32	10/31/2018 12:23 PM	0.71	1.68	1.75	0.05	0.052	-0.002	0	0	1.74	0	0	0
DMH-32_Weir	10/31/2018 12:23 PM	0.16	0	0.32	0	0.005	-0.009	0	0	2.34	0	0	0
J1	10/31/2018 12:05 PM	0.24	0.28	0.68	0.01	0.021	0.006	0	0	5.25	0	0	0
J10	10/31/2018 12:05 PM	0.13	0.41	0.41	0.012	0.012	0	0	0	5.47	0	0	0
J11	10/31/2018 12:05 PM	0.43	0.96	0.96	0.027	0.027	0	0	0	4.685	0	0	0
J1145	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	30.002	0	0	0
J12	10/31/2018 12:05 PM	0.45	1.11	1.11	0.032	0.032	0.001	0	0	4.25	0	0	0
J13	10/31/2018 12:05 PM	0.49	1.25	2.21	0.035	0.061	0	0	0	3.988	0	0	0
J1334	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	29.995	0	0	0
J14	10/31/2018 12:05 PM	0.19	0	0.57	0	0.016	0.001	0	0	5.01	0	0	0
J15	10/31/2018 12:05 PM	0.38	0.57	0.57	0.016	0.016	-0.001	0	0	4.62	0	0	0
J155	10/31/2018 12:27 PM	0.47	3.84	3.84	0.107	0.108	4.562	0	0	-0.475	0	0	0
J1574	10/31/2018 12:06 PM	0.1	0	5.13	0	0.082	0.002	0	0	29.895	0	0	0
J16	10/31/2018 12:05 PM	0.15	0	0.29	0	0.008	0.001	0	0	5.45	0	0	0
J17	10/31/2018 12:05 PM	0.22	0.29	0.29	0.008	0.008	-0.001	0	0	4.797	0	0	0
J18	10/31/2018 12:05 PM	0.23	0.66	0.66	0.018	0.018	0	0	0	4	0	0	0
J2	10/31/2018 12:10 PM	0.25	0	0.94	0	0.034	0.001	0	0	6.15	0	0	0
J20	10/31/2018 12:05 PM	0.37	0.81	1.92	0.023	0.056	-0.002	0	0	4.83	0	0	0
J22	10/31/2018 12:05 PM	0.18	0.51	0.51	0.014	0.014	0.003	0	0	4.32	0	0	0
J23	10/31/2018 12:05 PM	0.47	0	2.42	0	0.07	0.001	0	0	4.879	0	0	0
J25	10/31/2018 12:05 PM	0.3	0.45	0.45	0.015	0.015	-0.008	0	0	4.5	0	0	0
J26	10/31/2018 12:20 PM	0.3	1.27	1.55	0.055	0.069	0.002	0	0	4.9	0	0	0
J27	10/31/2018 12:15 PM	0.6	0.38	0.38	0.028	0.028	0.101	0	0	4.4	0	0	0

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
J28	10/31/2018 12:06 PM	0.39	0.09	1.71	0.007	0.082	0.001	0	0	5.33	0	0	0
J29	10/31/2018 12:05 PM	0.67	1.64	1.64	0.047	0.047	-0.011	0	0	7.49	0	0	0
J3	10/31/2018 12:05 PM	0.3	0.39	0.39	0.011	0.011	-0.012	0	0	4.743	0	0	0
J30	10/31/2018 12:05 PM	0.79	2.47	3.32	0.077	0.102	-0.001	0	0	3.7	0	0	0
J31	10/31/2018 12:05 PM	0.57	0.86	0.86	0.025	0.025	0.006	0	0	3.73	0	0	0
J32	10/31/2018 12:07 PM	0.46	0	2.44	0	0.111	0.002	0	0	3.84	0	0	0
J34	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	3.95	0	0	0
J4	10/31/2018 12:05 PM	0.22	0.51	0.51	0.014	0.014	0.001	0	0	4.756	0	0	0
J428	11/02/2018 00:00 AM	2.08	6.73	6.78	0.225	0.238	0	0	0	27.918	0	0	0
J445	10/31/2018 12:28 PM	0.04	0	1.38	0	0.009	0.025	0	0	0.452	0	0	0
J5	10/31/2018 14:50 PM	0.05	0.02	0.02	0.003	0.003	0.036	0	0	5.026	0	0	0
J564	10/31/2018 12:26 PM	0.09	0	4.28	0	0.167	-0.001	0	0	0.408	0	0	0
J6	10/31/2018 12:10 PM	0.41	0.94	0.94	0.034	0.034	-0.001	0	0	5.018	0	0	0
J611	10/31/2018 12:26 PM	0.1	3.9	4.31	0.158	0.167	-0.001	0	0	0.394	0	0	0
J66	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	0.497	0	0	0
J7	10/31/2018 12:05 PM	0.18	0.55	1.06	0.015	0.029	0	0	0	6.332	0	0	0
J71	10/31/2018 12:07 PM	0.38	0	1.71	0	0.082	-0.001	0	0	4.597	0	0	0
J8	10/31/2018 12:10 PM	0.18	0.97	0.97	0.032	0.035	-0.003	0	0	5.399	0	0	0
J9	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	4.8	0	0	0
MH1	10/31/2018 12:19 PM	0.96	0	5.21	0	0.343	0	0	0	5.264	0	0	0
MH10	10/31/2018 12:06 PM	0.03	0	0.02	0	0.001	0.013	0	0	1.77	0	0	0
MH11	10/31/2018 12:06 PM	1.41	0.08	3.78	0.003	0.112	-0.003	0	0	1.778	0	0	0
MH12	10/31/2018 12:05 PM	0.43	1.28	2.8	0.036	0.083	0.001	0	0	2.727	0	0	0
MH13	10/31/2018 12:05 PM	0.3	1.12	1.53	0.035	0.046	-0.005	0	0	4.44	0	0	0
MH14	10/31/2018 12:05 PM	0.19	0.42	0.42	0.012	0.012	0.013	0	0	4.013	0	0	0
MH15	10/31/2018 12:05 PM	0.32	0.28	1.55	0.008	0.048	-0.009	0	0	5.192	0	0	0

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
MH16	10/31/2018 12:05 PM	0.55	0.97	1.29	0.03	0.04	-0.001	0	0	4.626	0	0	0
MH17	10/31/2018 12:05 PM	0.17	0.32	0.32	0.01	0.01	-0.004	0	0	3.838	0	0	0
MH18	10/31/2018 12:07 PM	2.54	0	12.07	0	0.498	-0.035	0	0	1.117	0	0	0
MH2	10/31/2018 12:23 PM	1.22	0	4.53	0	0.3	0.001	0	0	5.067	0	0	0
MH3	10/31/2018 12:23 PM	1.43	0	4.53	0	0.3	0	0	0	4.559	0	0	0
MH4	10/31/2018 12:22 PM	3.25	2.51	4.61	0.083	0.3	0.031	0	0	0.929	0	0	0
MH8	10/31/2018 12:06 PM	0.08	0	0.01	0	0	0.247	0	0	2.22	0	0	0
MH9	10/31/2018 12:06 PM	0.19	0	0.02	0	0.001	1.547	0	0	1.81	0	0	0
OF-SP-1-WJ	10/31/2018 12:18 PM	0.76	0	5.21	0	0.343	-0.002	0	0	0.74	0	0	0
SC1	10/31/2018 12:06 PM	1.05	0	11.06	0	0.333	0	0	0	9.15	0	0	0
SC-1	10/31/2018 12:24 PM	0.81	0	1.67	0	0.049	0.028	0	0	1.71	0	0	0
StillingBasin	10/31/2018 11:59 AM	1.17	0	8.91	0	0.33	-0.409	0	0	5.33	0	0	0

Table 3D: Junctions

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
_CourtStPond_Outlet	0	0	0	0	0	0	1
_Rt6Basin_OF	0	0	0	0	0	0	1
_SouthSPPondOF	0	0	0	0	0	0	1
CB1	0	0	0	0	0	0	1
CB10	0	0	0	0	0	0	1
CB101	0	0	0	0	0	0	1
CB104	0	0	0	0	0	0	1
CB105	0	0	0	0	0	0	1

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CB112	0	0	0	0	0	0	1
CB2	0	0	0	0	0	0	1
CB27	0	0	0	0	0	0	1
CB28	0	0	0	0	0	0	1
CB29	0	0	0	0	0	0	1
CB3	0	0	0	0	0	0	1
CB30	0	0	0	0	0	0	1
CB31	0	0	0	0	0	0	1
CB32	0	0	0	0	0	0	1
CB33	0	0	0	0	0	0	1
CB35	0	0	0	0	0	0	1
CB36	0	0	0	0	0	0	1
CB37	0	0	0	0	0	0	1
CB38	0	0	0	0	0	0	1
CB4	0	0	0	0	0	0	1
CB6	0	0	0	0	0	0	1
DMH-03	0	0	0	0	0	0	1
DMH-06	0	0	0	0	0	0	1
DMH-07	0	0	0	0	0	0	1
DMH-08	0	0	0	0	0	0	1
DMH-09	0	0	0	0	0	0	1
DMH1	0	0	0	0	0	0	1
DMH-10	0	0	0	0	0	0	1
DMH-12	0	0	0	0	0	0	1
DMH-13	0	0	0	0	0	0	1
DMH-14	0	0	0	0	0	0	1

Draft

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
DMH-15	0	0	0	0	0	0	1
DMH-16	0	0	0	0	0	0	1
DMH-17	0	0	0	0	0	0	1
DMH-18	0	0	0	0	0	0	1
DMH2	0	0	0	0	0	0	1
DMH-25	0	0	0	0	0	0	1
DMH-26	0	0	0	0	0	0	1
DMH-27	0	0	0	0	0	0	1
DMH-28	0	0	0	0	0	0	1
DMH3	0	0	0	0	0	0	1
DMH-30	0	0	0	0	0	0	1
DMH-31	0	0	0	0	0	0	1
DMH-32	0	0	0	0	0	0	1
DMH-32_Weir	0	0	0	0	0	0	1
J1	0	0	0	0	0	0	1
J10	0	0	0	0	0	0	1
J11	0	0	0	0	0	0	1
J1145	0	0	0	0	0	0	1
J12	0	0	0	0	0	0	1
J13	0	0	0	0	0	0	1
J1334	0	0	0	0	0	0	1
J14	0	0	0	0	0	0	1
J15	0	0	0	0	0	0	1
J155	0	0	0	0	0	0	1
J1574	0	0	0	0	0	0	1
J16	0	0	0	0	0	0	1

Hydro

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J17	0	0	0	0	0	0	1
J18	0	0	0	0	0	0	1
J2	0	0	0	0	0	0	1
J20	0	0	0	0	0	0	1
J22	0	0	0	0	0	0	1
J23	0	0	0	0	0	0	1
J25	0	0	0	0	0	0	1
J26	0	0	0	0	0	0	1
J27	0	0	0	0	0	0	1
J28	0	0	0	0	0	0	1
J29	0	0	0	0	0	0	1
J3	0	0	0	0	0	0	1
J30	0	0	0	0	0	0	1
J31	0	0	0	0	0	0	1
J32	0	0	0	0	0	0	1
J34	0	0	0	0	0	0	1
J4	0	0	0	0	0	0	1
J428	0	0	0	0	0	0	1
J445	0	0	0	0	0	0	1
J5	0	0	0	0	0	0	1
J564	0	0	0	0	0	0	1
J6	0	0	0	0	0	0	1
J611	0	0	0	0	0	0	1
J66	0	0	0	0	0	0	1
J7	0	0	0	0	0	0	1
J71	0	0	0	0	0	0	1

Hard

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J8	0	0	0	0	0	0	1
J9	0	0	0	0	0	0	1
MH1	0	0	0	0	0	0	1
MH10	0	0	0	0	0	0	1
MH11	0	0	0	0	0	0	1
MH12	0	0	0	0	0	0	1
MH13	0	0	0	0	0	0	1
MH14	0	0	0	0	0	0	1
MH15	0	0	0	0	0	0	1
MH16	0	0	0	0	0	0	1
MH17	0	0	0	0	0	0	1
MH18	0	0	0	0	0	0	1
MH2	0	0	0	0	0	0	1
MH3	0	0	0	0	0	0	1
MH4	0	0	0	0	0	0	1
MH8	0	0	0	0	0	0	1
MH9	0	0	0	0	0	0	1
OF-SP-1-WJ	0	0	0	0	0	0	1
SC1	0	0	0	0	0	0	1
SC-1	0	0	0	0	0	0	1
StillingBasin	0	0	0	0	0	0	1

Hydro

Table 4A: Orifices

Name	Inlet Node	Outlet Node	Contributing Area (ac)	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)
OR1	_CourtStWetlandArea	_CourtStPond_Outlet	0		BOTTOM	RECT_CLOSED	4	2	3	0.65	NO	0	NO	0
OR108	CB104	J445	0		BOTTOM	RECT_CLOSED	2	2	4.439	0.65	NO	0	NO	1.38
OR131	CB112	J564	0		BOTTOM	RECT_CLOSED	2	2	3.838	0.65	NO	0	NO	0.34
OR21	DMH-13	J978	0		BOTTOM	RECT_CLOSED	2	2	7.627	0.65	NO	0	NO	0
OR23	DMH-28	J1379	0		BOTTOM	RECT_CLOSED	2	2	1.591	0.65	NO	0	NO	0.08
OR45	CB105	J66	0		BOTTOM	RECT_CLOSED	2	2	2.054	0.65	NO	0	NO	0
OR5	DMH-28	J1402	0		BOTTOM	RECT_CLOSED	2	2	1.361	0.65	NO	0	NO	0.75

Table 4B: Orifices

Name	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OR1	10/31/2018 00:00 AM	0	0	0	0	19.804	0	1
OR108	10/31/2018 12:25 PM	0	0	0	0	3.422	0	1
OR131	10/31/2018 12:32 PM	0	0	0	0	3.186	0	1
OR21	10/31/2018 00:00 AM	0	0	0	0	11.146	0	1
OR23	10/31/2018 12:07 PM	0	0	0	0	25.907	0	1
OR45	10/31/2018 00:00 AM	0	0	0	0	3.694	0	1
OR5	10/31/2018 12:14 PM	0	0	0	0	13.284	0	1

Table 5A: Outfalls

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Tide Gate	Route To	Type	Fixed Stage (ft)	Curve Name	Series Name	Outlet	Baseline (cfs)	Baseline Pattern
OF-RS-10-S	1008709.714	2846286.735	Zone1	NO	NO	23.64	23.64	NO		FREE	0	*	*		0	
OF-RS-11-N	1008997.279	2846761.397	Zone1	NO	NO	18.64	18.64	NO		FREE	0	*	*		0	
OF-RS-12-N	1009705.646	2847331.275	Zone1	NO	NO	4.5	4.5	NO		FREE	0	*	*		0	
OF-RS-13-S	1010007.673	2847359.157	Zone1	NO	NO	4.12	4.12	NO		FREE	0	*	*		0	
OF-RS-1-N	1005291.471	2844369.017		NO	NO	12.17	12.17	NO		FREE	0	*	*		0	
OF-RS-2-N	1005381.777	2844473.665		NO	NO	7.26	7.26	NO		FREE	0	*	*		0	
OF-RS-3-N	1005823.967	2844899.856		NO	NO	19.37	19.37	NO		FREE	0	*	*		0	
OF-RS-4-S	1006279.282	2844959.564		NO	NO	11.15	11.15	NO		FREE	0	*	*		0	
OF-RS-5-S	1006567.492	2845149.66		NO	NO	10.22	10.22	NO		FREE	0	*	*		0	
OF-RS-6-N	1006807.849	2845520.893	Zone1	NO	NO	25.67	25.67	NO		FREE	0	*	*		0	
OF-RS-7-S	1007261.284	2845510.96	Zone1	NO	NO	25.15	25.15	NO		FREE	0	*	*		0	
OF-RS-8-N	1007630.539	2845893.742	Zone1	NO	NO	30.08	30.08	NO		FREE	0	*	*		0	
OF-RS-9-N	1007998.589	2846072.311	Zone1	NO	NO	33.13	33.13	NO		FREE	0	*	*		0	

Table 5B: Outfalls

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-10-S		1	0						0	0.01	0.13	23.77	10/31/2018 12:05 PM	0.13
OF-RS-11-N		1	0						0	0.02	0.24	18.88	10/31/2018 12:10 PM	0.24
OF-RS-12-N		1	0						0	0.04	0.4	4.9	10/31/2018 12:07 PM	0.4
OF-RS-13-S		1	0						0	0.05	0.72	4.84	10/31/2018 12:05 PM	0.72
OF-RS-1-N		1	0						0	0.02	0.22	12.39	10/31/2018 12:05 PM	0.22
OF-RS-2-N		1	0						0	0.03	0.41	7.67	10/31/2018 12:05 PM	0.4
OF-RS-3-N		1	0						0	0.03	0.47	19.84	10/31/2018 12:05 PM	0.47

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Table 5B: Outfalls (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-4-S		1	0						0	0.01	0.18	11.33	10/31/2018 12:10 PM	0.18
OF-RS-5-S		1	0						0	0.01	0.18	10.4	10/31/2018 12:05 PM	0.18
OF-RS-6-N		1	0						0	0.02	0.24	25.91	10/31/2018 12:05 PM	0.24
OF-RS-7-S		1	0						0	0.03	0.29	25.44	10/31/2018 12:20 PM	0.29
OF-RS-8-N		1	0						0	0.02	0.19	30.27	10/31/2018 12:05 PM	0.19
OF-RS-9-N		1	0						0	0.01	0.15	33.28	10/31/2018 12:05 PM	0.15

Table 5C: Outfalls

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-10-S	0	0.41	0	0.012	0	0	0	0	0	0	0	0	27.57	0.03	0.41	0.012
OF-RS-11-N	0	0.94	0	0.034	0	0	0	0	0	0	0	0	26.49	0.1	0.94	0.034
OF-RS-12-N	0	2.44	0	0.111	0	0	0	0	0	0	0	0	28.89	0.3	2.44	0.111
OF-RS-13-S	7.84	11.13	0.239	0.341	0	0	0	0	0	0	0	0	37.74	0.7	11.13	0.341
OF-RS-1-N	0	0.66	0	0.018	0	0	0	0	0	0	0	0	33.41	0.04	0.66	0.018
OF-RS-2-N	0	2.4	0	0.07	0	0	0	0	0	0	0	0	43.6	0.12	2.4	0.07
OF-RS-3-N	0	2.21	0	0.061	0	0	0	0	0	0	0	0	31.02	0.15	2.21	0.061
OF-RS-4-S	0	0.97	0	0.035	0	0	0	0	0	0	0	0	27.58	0.1	0.97	0.035
OF-RS-5-S	0	1.06	0	0.029	0	0	0	0	0	0	0	0	31.24	0.07	1.06	0.029
OF-RS-6-N	0	0.68	0	0.021	0	0	0	0	0	0	0	0	29.93	0.05	0.68	0.021
OF-RS-7-S	0	1.55	0	0.069	0	0	0	0	0	0	0	0	29.05	0.18	1.55	0.069
OF-RS-8-N	0	0.57	0	0.016	0	0	0	0	0	0	0	0	39.34	0.03	0.57	0.016
OF-RS-9-N	0	0.29	0	0.008	0	0	0	0	0	0	0	0	35.23	0.02	0.29	0.008

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Table 5D: Outfalls

Name	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OF-RS-10-S	0	0	0	0	0	1
OF-RS-11-N	0	0	0	0	0	1
OF-RS-12-N	0	0	0	0	0	1
OF-RS-13-S	0	0	0	0	0	1
OF-RS-1-N	0	0	0	0	0	1
OF-RS-2-N	0	0	0	0	0	1
OF-RS-3-N	0	0	0	0	0	1
OF-RS-4-S	0	0	0	0	0	1
OF-RS-5-S	0	0	0	0	0	1
OF-RS-6-N	0	0	0	0	0	1
OF-RS-7-S	0	0	0	0	0	1
OF-RS-8-N	0	0	0	0	0	1
OF-RS-9-N	0	0	0	0	0	1

Table 6A: Conduits

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
_C101	_CourtStPond_Outlet	DMH1	prop	36.453	0.011	0	3.88	0	0	0.5	0	0
_C102	CB4	DMH2	prop	77.715	0.011	0	0	0	0	0.5	0	0
_C105	DMH3	CB6	prop	145.588	0.011	0	0	0	0	0.5	0	0
_C107	DMH-17	_CourtStWetlandArea	Zone4	20	0.011	0	2.7	0	0	0.5	0	0
C1	CB105	CB104		263.405	0.014	0	0.15	0	0	0.5	0	0
C10	J20	J23		207.904	0.014	0	0	0	0	0.5	0	0
C103	DMH2	SC1	prop	14.373	0.011	0	0	0	0	0.5	0	0

LEVEL C

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C103_1	DMH-13	DMH-14	prop	166.97	0.011	0	0	0	0	0.5	0	0
C105	DMH1	DMH2		29.411	0.01	0	0	0	0	0	0	0
C107	CB6	CB4	prop	95.958	0.011	0	0	0	0	0.5	0	0
C109	DMH-12	DMH-13	prop	265.697	0.011	0	0	0	0	0.5	0	0
C11	CB10	CB3		28.475	0.014	0	0	0	0	0.5	0	0
C111	J66	J445	road	263.865	0.011	0	0	0	0	0	0	0
C115	DMH-09	DMH-08	prop	70.423	0.011	0	0	0	0	0.5	0	0
C12	CB3	CB2		48.17	0.014	0	0	0	0	0.5	0	0
C13	CB2	CB1		25.561	0.014	0	0	0	0	0.5	0	0
C14	DMH-30	DMH-31		217.068	0.011	0	0	0	0	0.5	0	0
C141	SC1	_PSWetWell	prop	16.979	0.011	0	9	0	0	0.5	0	0
C1418	DMH-14	DMH-18	prop	58.106	0.011	0	0	0	0	0.5	0	0
C15	DMH-18	DMH-15		114.64	0.011	0	0	0	0	0.5	0	0
C155	DMH-27	DMH-28	prop	217.352	0.011	0	0	0	0	0.5	0	0
C16	DMH-16	DMH-15		48.81	0.011	0	0	0	0	0.5	0	0
C17	DMH-26	DMH-27	prop	107.718	0.011	0	0	0	0	0.5	0	0
C18	MH18	WinthropPond	Zone6	482.605	0.011	0	0	0	0	0.5	0	0
C19	StillingBasin	DMH-10		99.75	0.011	0	0	0	0	0	0	0
C19_2	DMH-32_Weir	DMH-31		32.607	0.011	0	0.67	0	0	0	0	0
C2	CB104	CB112		471.27	0.014	0	0.89	0	0	0.5	0	0
C20	DMH-32	SC-1		23.899	0.011	0	0	0	0	0.5	0	0
C21	DMH-10	DMH-09	prop	203.077	0.011	0	0	0	0	0.5	0	0
C21017	J1405	J369	2D_Winthrop	19.627	0.011	0	0	0	0	0	0	0
C21018	J1382	J369	2D_Winthrop	22.144	0.011	0	0	0	0	0	0	0
C21048	J1383	J370	2D_Winthrop	26.203	0.011	0	0	0	0	0	0	0
C21088	J1383	J361	2D_Winthrop	26.17	0.011	0	0	0	0	0	0	0

FIELD

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C21134	J1382	J361	2D_Winthrop	21.554	0.011	0	0	0	0	0	0	0
C21144	J1361	J361	2D_Winthrop	16.278	0.011	0	0	0	0	0	0	0
C22	DMH-08	DMH-07	prop	77.395	0.011	0	0	0	0	0.5	0	0
C22143	J1140	J218	2D_Court	23.818	0.011	0	0	0	0	0	0	0
C22244	J1105	_CourtStWetlandArea	2D_Court	25.776	0.011	0	1	0	0	0	0	0
C22267	J1105	J210	2D_Court	21.342	0.011	0	0	0	0	0	0	0
C22328	J1084	J210	2D_Court	20.667	0.011	0	0	0	0	0	0	0
C22348	J200	J210	2D_Court	24.248	0.15	0	0	0	0	0	0	0
C23	DMH-07	DMH-03	prop	97.892	0.011	0	0	0	0	0.5	0	0
C2314	SC-1	SU1		8.155	0.011	0	0.5	0	0	0.5	0	0
C24	J34	_Rt6Basin&Forebay	prop	98.475	0.011	0	4.1	0	0	0.5	0	0
C2406	J433	J432	2D_SouthShankPainter	29.38	0.15	0	0	0	0	0	0	0
C2414	J421	J432	2D_SouthShankPainter	27.713	0.15	0	0	0	0	0	0	0
C2454	J421	J420	2D_SouthShankPainter	27.174	0.15	0	0	0	0	0	0	0
C2489	J1562	J420	2D_SouthShankPainter	22.535	0.011	0	0	0	0	0	0	0
C25	DMH-06	J34	prop	51.398	0.011	0	1.3	0	0	0.5	0	0
C2547	J1550	_SouthSPPondOF	2D_SouthShankPainter	26.212	0.011	0	0.072	0	0	0	0	0
C2549	J1538	_SouthSPPondOF	2D_SouthShankPainter	26.943	0.011	0	0.072	0	0	0	0	0
C2592	J1521	J400	2D_SouthShankPainter	18.564	0.011	0	0	0	0	0	0	0
C26	Rt6Drywells	_Rt6Basin&Forebay	prop	177.669	0.011	3.43	4.1	0	0	0.5	0	0
C27	J23	OF-RS-2-N		16.68	0.014	0	0	0	0	0.5	0	0
C28	DMH-03	_Rt6Basin&Forebay	prop	95.514	0.011	0	4.1	0	0	0.5	0	0
C2988	J1425	J369	2D_Winthrop	25.153	0.011	0	0	0	0	0	0	0
C3	CB112	MH4		247.982	0.014	0	0	0	0	0.5	0	0
C30	DMH-31	_SouthSPPondOF	Zone5	43.924	0.011	0	0	0	0	0.5	0	0
C31	CB36	CB35		31.906	0.014	0	0	0	0	0.5	0	0

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C33	CB1	MH1		12.784	0.011	0	0	0	0	0.5	0	0
C37	CB30	DW#9		15.234	0.014	0	0	0	0	0.5	0	0
C38	CB29	DW#9		20.886	0.014	0	0	0	0	0.5	0	0
C39	CB27	MH18		54.24	0.014	0	0	0	0	0.5	0	0
C4	MH4	CB101		119.267	0.014	0	0	0	0	0.5	0	0
C40	MH8	MH9		25.283	0.014	0	0	0	0	0.5	0	0
C41	MH9	MH10		23.109	0.014	0	0	0	0	0.5	0	0
C42	MH10	MH18		39.24	0.014	0	0	0	0	0.5	0	0
C43	CB33	MH18		40.72	0.014	0	0	0	0	0.5	0	0
C44	CB28	MH18		27.307	0.014	0	0	0	0	0.5	0	0
C45	MH11	MH18		122.435	0.014	0	0	0	0	0.5	0	0
C46	MH12	MH11		84.66	0.014	0	0	0	0	0.5	0	0
C47	CB31	MH11		13.987	0.014	0	0	0	0	0.5	0	0
C48	CB32	MH11		53.849	0.014	0	0	0	0	0.5	0	0
C49	MH14	MH13		212.01	0.014	0	0	0	0	0.5	0	0
C5	CB101	MH3		43.66	0.014	0	0	0	0	0.5	0	0
C50	MH13	MH12		219.97	0.014	0	0	0	0	0.5	0	0
C51	MH16	MH15		116.201	0.014	0	0	0	0	0.5	0	0
C52	MH15	MH18		432.199	0.014	0	0	0	0	0.5	0	0
C53	MH17	MH16		134.35	0.014	0	0	0	0	0.5	0	0
C54	CB37	CB36		48.25	0.014	0	0	0	0	0.5	0	0
C55	CB38	CB37		20.613	0.014	0	0	0	0	0.5	0	0
C56	CB35	J32		19.765	0.014	0	0	0	0	0.5	0	0
C57	J18	OF-RS-1-N		45.993	0.014	0	0	0	0	0.5	0	0
C58	J22	J23		125.62	0.014	0	0	0	0	0.5	0	0
C59	J11	J13		35.428	0.014	0	0	0	0	0.5	0	0

HELD

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C6	MH3	MH2	prop	114.494	0.014	0	0	0	0	0.5	0	0
C60	J13	OF-RS-3-N		122.618	0.014	0	0	0	0	0.5	0	0
C61	J5	J8		70.68	0.014	0	0	0	0	0.5	0	0
C62	J8	OF-RS-4-S		67.751	0.014	0	0	0	0	0.5	0	0
C64	J4	J7		70.823	0.014	0	0	0	0	0.5	0	0
C65	J7	OF-RS-5-S		67.331	0.014	0	0	0	0	0.5	0	0
C66	J3	J1		75.518	0.014	0	0	0	0	0.5	0	0
C67	J1	OF-RS-6-N	Zone1	64.921	0.014	0	0	0	0	0.5	0	0
C68	J6	J2		76.875	0.014	0	0	0	0	0.5	0	0
C6814	J445	J611	road	301.421	0.011	0	0	0	0	0	0	0
C6815	J611	J564	road	169.519	0.011	0	0	0	0	0	0	0
C6816	J564	J672	road	29.034	0.011	0	0	0	0	0	0	0
C69	J2	OF-RS-11-N	Zone1	52.784	0.014	0	0	0	0	0.5	0	0
C7	MH2	MH1	prop	190.137	0.014	0	0	0	0	0.5	0	0
C70	J9	J10		77.687	0.014	0	0	0	0	0.5	0	0
C71	J10	OF-RS-10-S	Zone1	69.271	0.014	0	0	0	0	0.5	0	0
C7147	OF-SP-1-WJ	DuckPond	Zone2	20	0.014	0	0	0	0	0.5	0	0.5
C72	J17	J16		75.234	0.014	0	0	0	0	0.5	0	0
C73	J16	OF-RS-9-N	Zone1	53.115	0.014	0	0	0	0	0.5	0	0
C74	J15	J14		75.097	0.014	0	0	0	0	0.5	0	0
C75	J14	OF-RS-8-N	Zone1	60.067	0.014	0	0	0	0	0.5	0	0
C76	J25	J26		70.204	0.014	0	0	0	0	0.5	0	0
C77	J26	OF-RS-7-S	Zone1	74.453	0.014	0	0	0	0	0.5	0	0
C78	J31	J30		52.913	0.014	0	0	0	0	0.5	0	0
C79	J30	OF-RS-13-S	Zone1	50.828	0.014	0	0	0	0	0.5	0	0
C8	MH1	OF-SP-1-WJ	prop	20.094	0.014	0	0	0	0	0.5	0	0

REVIEWED

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C80	J27	J28		84.437	0.014	0	0	0	0	0.5	0	0
C81_1	J28	J71	prop	208.587	0.014	0	0	0	0	0.5	0	0
C81_2	J71	J32	prop	193.283	0.014	0	0	0	0	0.5	0	0
C82	J29	J28		113.251	0.014	0	0	0	0	0.5	0	0
C83	J32	OF-RS-12-N	Zone1	21.49	0.014	0	0	0	0	0.5	0	0
C9	J12	J20		67.86	0.014	0	0	0	0	0.5	0	0
C90	DMH-25	DMH-26	prop	70.342	0.011	0	0	0	0	0.5	0	0
C92	DMH-28	DMH-30	prop	39.182	0.011	0	0	0	0	0.5	0	0
C97	DMH-15	DMH-17	prop	28.577	0.011	0	0	0	0	0.5	0	0

Table 6B: Conduits

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
_C101	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01976	0
_C102	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00579	11.07
_C105	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00673	0
_C107	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.008	11.9
C1	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02256	3.4
C10	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03851	1.91
C103	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01113	11.06
C103_1	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.02001	10.52
C105	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.02755	0.02
C107	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00604	0.14
C109	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.025	4.59

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Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C11	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00808	0
C111	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.01404	0
C115	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.02983	10.76
C12	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00104	0.02
C13	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01956	1.57
C14	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00378	5.79
C141	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01355	11.06
C1418	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00602	11.48
C15	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00401	11.91
C155	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00405	4.41
C16	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00799	0.02
C17	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00418	0.36
C18	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00787	11.35
C19	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00912	10.33
C19_2	0	YES	CIRCULAR	1	0	0	0	1				NO		NO	0.02043	0.32
C2	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00352	2.88
C20	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00418	1.57
C21	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.02847	10.99
C21017	0	NO	RECT_OPEN	30	16.356	2	0	1				NO		NO	0.04938	0
C21018	0	NO	RECT_OPEN	30	17.034	2	0	1				NO		NO	0.04684	0
C21048	0	NO	RECT_OPEN	30	18.716	2	0	1				NO		NO	0.04087	0
C21088	0	NO	RECT_OPEN	30	18.693	2	0	1				NO		NO	0.04092	0
C21134	0	NO	RECT_OPEN	30	17.962	2	0	1				NO		NO	0.04812	0
C21144	0	NO	RECT_OPEN	30	12.521	2	0	1				NO		NO	0.0484	2.99
C22	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01421	10.68
C22143	0	NO	RECT_OPEN	30	19.848	2	0	1				NO		NO	0.0917	0

Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C22244	0	NO	RECT_OPEN	30	19.828	2	0	1				NO		NO	0.3487	0
C22267	0	NO	RECT_OPEN	30	17.785	2	0	1				NO		NO	0.31905	0
C22328	0	NO	RECT_OPEN	30	17.222	2	0	1				NO		NO	0.35436	0
C22348	0	NO	RECT_OPEN	30	20.207	2	0	1				NO		NO	0.32717	0
C23	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00409	13.99
C2314	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00491	1.67
C24	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00203	0
C2406	0	NO	RECT_OPEN	30	20.986	2	0	1				NO		NO	0.11675	0.04
C2414	0	NO	RECT_OPEN	30	23.094	2	0	1				NO		NO	0.10717	0.2
C2454	0	NO	RECT_OPEN	30	20.903	2	0	1				NO		NO	0.17295	0.36
C2489	0	NO	RECT_OPEN	30	17.335	2	0	1				NO		NO	0.19457	3.12
C25	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00973	0
C2547	0	NO	RECT_OPEN	30	20.163	2	0	1				NO		NO	0.15568	0.18
C2549	0	NO	RECT_OPEN	30	19.245	2	0	1				NO		NO	0.14871	0.02
C2592	0	NO	RECT_OPEN	30	15.47	2	0	1				NO		NO	0.05216	0
C26	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00225	0.07
C27	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04441	2.4
C28	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00419	14.76
C2988	0	NO	RECT_OPEN	30	19.348	2	0	1				NO		NO	0.05722	0
C3	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00464	3.17
C30	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00182	6.84
C31	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00752	0.74
C33	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06664	1.57
C37	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.28829	0.61
C38	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.18151	0.61
C39	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04984	0.25

Hydro

Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C4	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01048	4.54
C40	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00435	0.01
C41	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	-0.00606	0.02
C42	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.07513	0.02
C43	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00614	7.34
C44	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00732	0.17
C45	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02206	3.58
C46	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0473	2.8
C47	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06088	0.04
C48	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0039	0.91
C49	0	NO	CIRCULAR	0.833	0	0	0	1				NO		NO	0.03304	0.42
C5	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01145	4.53
C50	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05463	1.53
C51	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0043	1.28
C52	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04563	1.55
C53	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02189	0.32
C54	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00477	0.47
C55	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03009	0.47
C56	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06388	0.74
C57	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03416	0.66
C58	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05181	0.51
C59	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00847	0.96
C6	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00437	4.53
C60	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01085	2.21
C61	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0099	0.02
C62	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.17455	0.97

Hydro

Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C64	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02401	0.51
C65	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.20909	1.06
C66	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00397	0.39
C67	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02666	0.68
C68	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00781	0.94
C6814	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00739	1.3
C6815	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00493	4.28
C6816	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00696	4.14
C69	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05236	0.94
C7	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00447	4.53
C70	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01287	0
C71	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.10685	0.41
C7147	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.03352	5.21
C72	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00798	0.29
C73	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03523	0.29
C74	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00266	0.57
C75	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04867	0.57
C76	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0057	0.45
C77	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06663	1.55
C78	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00567	0.86
C79	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01338	3.32
C8	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00299	5.21
C80	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	-0.00213	0.39
C81_1	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.01911	1.71
C81_2	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.01912	1.71
C82	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00327	1.64

Hydro

Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C83	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04658	2.44
C9	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00737	1.11
C90	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00739	0.11
C92	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00766	5.7
C97	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00525	11.9

Table 6C: Conduits

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft^3)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
_C101	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
_C102	10/31/2018 12:05 PM	5.52	0.54	0.61	0			1	0	0	0	0
_C105	10/31/2018 00:00 AM	0	0	0.34	0			1	0	0	0	0
_C107	10/31/2018 12:06 PM	6.69	0.5	0.55	0			1	0	0	0	0
C1	10/31/2018 12:26 PM	4.41	0.69	1	0			1	0	0	0	0
C10	10/31/2018 12:05 PM	6.07	0.29	0.42	0			1	0	0	0	0
C103	10/31/2018 12:06 PM	6.09	0.39	0.56	0			1	0	0	0	0
C103_1	10/31/2018 12:05 PM	6.15	0.28	0.54	0			1	0	0	0	0
C105	10/31/2018 11:57 AM	0.05	0	0.4	0			1	0	0	0	0
C107	10/31/2018 11:56 AM	0.29	0.01	0.64	0			1	0	0	0	0
C109	10/31/2018 12:15 PM	7.99	0.38	0.5	0			1	0	0	0	0
C11	10/31/2018 12:05 PM	0.05	0	0.28	0			1	0	0	0	0
C111	10/31/2018 00:00 AM	0	0	0.04	0			1	0	0	0	0
C115	10/31/2018 12:00 PM	8.05	0.5	0.73	0			1	0	0	0	0
C12	10/31/2018 11:56 AM	0.09	0.02	0.41	0			1	0	0	0	0

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Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C13	10/31/2018 12:05 PM	5.59	0.34	0.39	0			1	0	0	0	0
C14	10/31/2018 12:08 PM	5.01	1.23	0.92	0			1	0	0	0	0
C141	10/31/2018 12:06 PM	7.66	0.36	0.47	0			1	0	0	0	0
C1418	10/31/2018 12:05 PM	4.84	0.55	0.71	0			1	0	0	0	0
C15	10/31/2018 12:05 PM	5.09	0.7	0.7	0			1	0	0	0	0
C155	10/31/2018 12:06 PM	3.59	0.91	1	0			1	0	0	0	0
C16	10/31/2018 11:57 AM	0.04	0.01	0.99	0			1	0	0	0	0
C17	10/31/2018 12:04 PM	0.37	0.07	0.94	0			1	0	0	0	0
C18	10/31/2018 12:06 PM	6.42	1.03	1	0			1	0	0	0	0
C19	10/31/2018 12:00 PM	9.35	0.87	0.62	0			1	0	0	0	0
C19_2	10/31/2018 12:23 PM	4.01	0.05	0.46	0			1	0	0	0	0
C2	10/31/2018 12:43 PM	3.67	1.47	1	0			1	0	0	0	0
C20	10/31/2018 12:05 PM	3.02	0.58	0.76	0			1	0	0	0	0
C21	10/31/2018 12:00 PM	10.91	0.52	0.56	0			1	0	0	0	0
C21017	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C21018	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C21048	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C21088	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C21134	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C21144	10/31/2018 12:19 PM	3.12	0	0.01	0			1	0	0	0	0
C22	10/31/2018 12:00 PM	6.54	0.72	0.94	0			1	0	0	0	0
C22143	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C22244	10/31/2018 00:00 AM	0	0	0.03	0			1	0	0	0	0
C22267	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C22328	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C22348	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0

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Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C23	10/31/2018 12:01 PM	5.9	0.82	0.8	0			1	0	0	0	0
C2314	10/31/2018 12:05 PM	3.56	0.57	0.83	0			1	0	0	0	0
C24	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C2406	10/31/2018 12:07 PM	0.12	0	0	0			1	0	0	0	0
C2414	10/31/2018 12:08 PM	0.31	0	0	0			1	0	0	0	0
C2454	10/31/2018 12:07 PM	0.09	0	0.03	0			1	0	0	0	0
C2489	10/31/2018 12:07 PM	1.06	0	0.03	0			1	0	0	0	0
C25	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C2547	10/31/2018 12:07 PM	0.04	0	0.03	0			1	0	0	0	0
C2549	10/31/2018 12:08 PM	0	0	0.03	0			1	0	0	0	0
C2592	10/31/2018 12:13 PM	0	0	0	0			1	0	0	0	0
C26	10/31/2018 12:32 PM	1.31	0.04	0.12	0			1	0	0	0	0
C27	10/31/2018 12:05 PM	7.25	0.34	0.44	0			1	0	0	0	0
C28	10/31/2018 12:05 PM	5.93	0.85	0.74	0			1	0	0	0	0
C2988	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C3	10/31/2018 12:40 PM	4.04	1.41	1	0			1	0	0	0	0
C30	10/31/2018 12:07 PM	7.49	1.29	1	0			1	0	0	0	0
C31	10/31/2018 12:05 PM	4.2	0.26	0.28	0			1	0	0	0	0
C33	10/31/2018 12:05 PM	3.54	0.14	0.6	0			1	0	0	0	0
C37	10/31/2018 12:05 PM	0.78	0.03	1	0			1	0	0	0	0
C38	10/31/2018 12:05 PM	0.78	0.04	1	0			1	0	0	0	0
C39	10/31/2018 12:05 PM	0.55	0.03	0.56	0			1	0	0	0	0
C4	10/31/2018 12:21 PM	5.79	1.34	1	0			1	0	0	0	0
C40	10/31/2018 12:06 PM	0.21	0	0.13	0			1	0	0	0	0
C41	10/31/2018 12:06 PM	0.41	0.01	0.11	0			1	0	0	0	0
C42	10/31/2018 12:06 PM	0.05	0	0.52	0			1	0	0	0	0

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Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C43	10/31/2018 11:58 AM	9.34	2.83	1	0			1	0	0	0	0
C44	10/31/2018 12:05 PM	0.21	0.06	1	0			1	0	0	0	0
C45	10/31/2018 12:06 PM	4.6	0.73	1	0			1	0	0	0	0
C46	10/31/2018 12:05 PM	6.09	0.39	0.72	0			1	0	0	0	0
C47	10/31/2018 12:05 PM	0.07	0	0.78	0			1	0	0	0	0
C48	10/31/2018 12:04 PM	1.79	0.44	1	0			1	0	0	0	0
C49	10/31/2018 12:05 PM	3.13	0.11	0.29	0			1	0	0	0	0
C5	10/31/2018 12:22 PM	5.77	1.28	1	0			1	0	0	0	0
C50	10/31/2018 12:05 PM	5.84	0.2	0.37	0			1	0	0	0	0
C51	10/31/2018 12:05 PM	3.89	0.59	0.44	0			1	0	0	0	0
C52	10/31/2018 12:05 PM	2.82	0.22	0.66	0			1	0	0	0	0
C53	10/31/2018 12:05 PM	1.24	0.07	0.36	0			1	0	0	0	0
C54	10/31/2018 12:10 PM	2.04	0.21	0.34	0			1	0	0	0	0
C55	10/31/2018 12:10 PM	2.86	0.08	0.26	0			1	0	0	0	0
C56	10/31/2018 12:05 PM	3.35	0.09	0.33	0			1	0	0	0	0
C57	10/31/2018 12:05 PM	4.96	0.11	0.23	0			1	0	0	0	0
C58	10/31/2018 12:05 PM	2.31	0.07	0.32	0			1	0	0	0	0
C59	10/31/2018 12:05 PM	2.72	0.32	0.46	0			1	0	0	0	0
C6	10/31/2018 12:22 PM	3.7	1.14	0.99	0			1	0	0	0	0
C60	10/31/2018 12:05 PM	4.49	0.22	0.32	0			1	0	0	0	0
C61	10/31/2018 14:50 PM	0.89	0	0.09	0			1	0	0	0	0
C62	10/31/2018 12:10 PM	9.97	0.07	0.18	0			1	0	0	0	0
C64	10/31/2018 12:05 PM	4.44	0.1	0.2	0			1	0	0	0	0
C65	10/31/2018 12:05 PM	10.89	0.07	0.18	0			1	0	0	0	0
C66	10/31/2018 12:05 PM	2.25	0.19	0.27	0			1	0	0	0	0
C67	10/31/2018 12:05 PM	4.6	0.13	0.24	0			1	0	0	0	0

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Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C68	10/31/2018 12:10 PM	4.21	0.32	0.33	0			1	0	0	0	0
C6814	10/31/2018 12:28 PM	0.87	0.02	0.15	0			1	0	0	0	0
C6815	10/31/2018 12:26 PM	2.18	0.07	0.2	0			1	0	0	0	0
C6816	10/31/2018 12:26 PM	2.59	0.06	0.16	0			1	0	0	0	0
C69	10/31/2018 12:10 PM	6.4	0.12	0.24	0			1	0	0	0	0
C7	10/31/2018 12:23 PM	4.03	1.13	0.87	0			1	0	0	0	0
C70	10/31/2018 00:00 AM	0	0	0.07	0			1	0	0	0	0
C71	10/31/2018 12:05 PM	6.53	0.04	0.13	0			1	0	0	0	0
C7147	10/31/2018 12:19 PM	13.75	0.29	0.27	0			1	0	0	0	0
C72	10/31/2018 12:05 PM	2.86	0.1	0.18	0			1	0	0	0	0
C73	10/31/2018 12:05 PM	3.97	0.05	0.15	0			1	0	0	0	0
C74	10/31/2018 12:05 PM	3.07	0.33	0.29	0			1	0	0	0	0
C75	10/31/2018 12:05 PM	5.43	0.08	0.19	0			1	0	0	0	0
C76	10/31/2018 12:05 PM	2.63	0.18	0.28	0			1	0	0	0	0
C77	10/31/2018 12:20 PM	8.07	0.18	0.29	0			1	0	0	0	0
C78	10/31/2018 12:05 PM	1.51	0.34	0.68	0			1	0	0	0	0
C79	10/31/2018 12:05 PM	5.2	0.87	0.76	0			1	0	0	0	0
C8	10/31/2018 12:19 PM	4.96	0.98	0.57	0			1	0	0	0	0
C80	10/31/2018 12:20 PM	1.09	0.25	0.49	0			1	0	0	0	0
C81_1	10/31/2018 12:06 PM	5.27	0.21	0.31	0			1	0	0	0	0
C81_2	10/31/2018 12:07 PM	4.68	0.21	0.34	0			1	0	0	0	0
C82	10/31/2018 12:05 PM	3.87	0.87	0.53	0			1	0	0	0	0
C83	10/31/2018 12:07 PM	7.53	0.34	0.43	0			1	0	0	0	0
C9	10/31/2018 12:05 PM	3.65	0.39	0.41	0			1	0	0	0	0
C90	10/31/2018 12:04 PM	0.33	0.03	0.79	0			1	0	0	0	0
C92	10/31/2018 12:07 PM	4.64	0.85	1	0			1	0	0	0	0

Hold

Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft^3)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C97	10/31/2018 12:06 PM	5.56	0.61	0.64	0			1	0	0	0	0

Table 6D: Conduits

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
_C101	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
_C102	AUTOMATIC	0	0	0	0	0	1	0.1	0.59	0.29	0	0
_C105	AUTOMATIC	0	0	0	0	0	1	0.97	0	0	0	0
_C107	AUTOMATIC	0	0	0	0	0	1	0.06	0.68	0.03	0	0
C1	AUTOMATIC	0.17	0.17	0.84	0.01	0.01	1	0.06	0.02	0.1	0.11	0
C10	AUTOMATIC	0	0	0	0	0	1	0.05	0.01	0.45	0.87	0
C103	AUTOMATIC	0	0	0	0	0	1	0.05	0.08	0.29	0.66	0
C103_1	AUTOMATIC	0	0	0	0	0	1	0.09	0.51	0.35	0.91	0
C105	AUTOMATIC	0	0	0	0	0	1	0.63	0.01	0	0.74	0
C107	AUTOMATIC	0	0	0	0	0	1	0.12	0.03	0	0.74	0
C109	AUTOMATIC	0	0	0	0	0	1	0.13	0.48	0.37	0.35	0
C11	AUTOMATIC	0	0	0	0	0	1	0.69	0.01	0	0.74	0
C111	AUTOMATIC	0	0	0	0	0	1	0.9	0	0	0	0
C115	AUTOMATIC	0	0	0	0	0	1	0.07	0.5	0.43	0.38	0
C12	AUTOMATIC	0	0	0	0	0	1	0.16	0.31	0	0.5	0
C13	AUTOMATIC	0	0	0	0	0	1	0.16	0.5	0.34	0	0
C14	AUTOMATIC	0.01	0.24	32.62	0.29	0.01	1	0.07	0.93	0	0.16	0
C141	AUTOMATIC	0	0	0	0	0	1	0.06	0	0	0	0
C1418	AUTOMATIC	0	0	0	0	0	1	0.06	0.61	0.3	0.62	0

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Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C15	AUTOMATIC	0	0	0	0	0	1	0.06	0.74	0.2	0.49	0
C155	AUTOMATIC	0.13	0.13	0.24	0.01	0.01	1	0.08	0.39	0	0.76	0
C16	AUTOMATIC	0.01	0.01	0.43	0.01	0.01	1	0.54	0.05	0	0.72	0
C17	AUTOMATIC	0.01	0.01	0.13	0.01	0.01	1	0.61	0.04	0	0.74	0
C18	AUTOMATIC	0.35	0.35	36.05	0.14	0.21	1	0.03	0.8	0.17	0.8	0
C19	AUTOMATIC	0	0	0	0	0	1	0.07	0.17	0.05	0.73	0
C19_2	AUTOMATIC	0	0	0	0	0	1	0.25	0.67	0.01	0.1	0
C2	AUTOMATIC	0.74	0.88	0.74	0.91	0.74	1	0.08	0.02	0	0	0
C20	AUTOMATIC	0	0	0	0	0	1	0.05	0.95	0	0.51	0
C21	AUTOMATIC	0	0	0	0	0	1	0.07	0.5	0.43	0.59	0
C21017	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21018	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21048	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21088	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21134	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21144	AUTOMATIC	0	0	0	0	0	1	0.25	0.33	0	0.74	0
C22	AUTOMATIC	0.01	0.01	0.2	0.01	0.01	1	0.57	0.26	0.17	0.88	0
C22143	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C22244	AUTOMATIC	0	0	0	0	0	1	0.23	0	0	0	0
C22267	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C22328	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C22348	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C23	AUTOMATIC	0	0	0	0	0	1	0.07	0.42	0.01	0.84	0
C2314	AUTOMATIC	0	0	0	0	0	1	0.05	0.07	0	0	0
C24	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C2406	AUTOMATIC	0	0	0	0	0	1	0.62	0.02	0	0.75	0

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Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C2414	AUTOMATIC	0	0	0	0	0	1	0.61	0.35	0	0.5	0
C2454	AUTOMATIC	0	0	0	0	0	1	0.14	0.35	0	0.84	0
C2489	AUTOMATIC	0	0	0	0	0	1	0.14	0.84	0	0.84	0
C25	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C2547	AUTOMATIC	0	0	0	0	0	1	0.09	0.49	0	0.84	0
C2549	AUTOMATIC	0	0	0	0	0	1	0.09	0.28	0	0.84	0
C2592	AUTOMATIC	0	0	0	0	0	1	0.63	0.05	0.01	0.1	0
C26	AUTOMATIC	0	0	0	0	0	1	0.95	0	0	0	0
C27	AUTOMATIC	0	0	0	0	0	1	0.05	0.49	0.45	0	0
C28	AUTOMATIC	0	0	0	0	0	1	0.07	0	0	0	0
C2988	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C3	AUTOMATIC	0.81	0.85	0.84	0.76	0.7	1	0.13	0.85	0	0.49	0
C30	AUTOMATIC	27.33	27.33	29.63	0.23	0.01	1	0.07	0.9	0.02	0.11	0
C31	AUTOMATIC	0	0	0	0	0	1	0.24	0.5	0.26	0	0
C33	AUTOMATIC	0	0	0	0	0	1	0.16	0.3	0.04	0.82	0
C37	AUTOMATIC	41.46	41.46	44.17	0.01	0.01	1	0.04	0.96	0.01	0.09	0
C38	AUTOMATIC	41.67	41.67	44.17	0.01	0.01	1	0.04	0.95	0	0.07	0
C39	AUTOMATIC	0.01	0.01	0.5	0.01	0.01	1	0.03	0.95	0	0.97	0
C4	AUTOMATIC	0.81	0.84	0.81	0.81	0.81	1	0.18	0.51	0.31	0.44	0
C40	AUTOMATIC	0	0	0	0	0	1	0.15	0.85	0	0.01	0
C41	AUTOMATIC	0	0	0	0	0	1	0.15	0.83	0	0.02	0
C42	AUTOMATIC	0.01	0.01	0.5	0.01	0.01	1	0.03	0.83	0	0.83	0
C43	AUTOMATIC	0.5	0.78	0.5	0.9	0.5	1	0.03	0.63	0.29	0.13	0
C44	AUTOMATIC	0.43	0.43	0.5	0.01	0.01	1	0.03	0.48	0	0.82	0
C45	AUTOMATIC	0.1	0.1	0.5	0.01	0.01	1	0.03	0.47	0.01	0.96	0
C46	AUTOMATIC	0.01	0.01	0.1	0.01	0.01	1	0.52	0.01	0.47	0.97	0

Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C47	AUTOMATIC	0.01	0.01	0.1	0.01	0.01	1	0.52	0	0	0.75	0
C48	AUTOMATIC	0.07	0.07	0.1	0.01	0.01	1	0.52	0.37	0	0.84	0
C49	AUTOMATIC	0	0	0	0	0	1	0.03	0.61	0.27	0.88	0
C5	AUTOMATIC	0.7	0.81	0.7	0.73	0.7	1	0.18	0.58	0.25	0.55	0
C50	AUTOMATIC	0	0	0	0	0	1	0.03	0.5	0.48	0.96	0
C51	AUTOMATIC	0	0	0	0	0	1	0.51	0.24	0.24	0.49	0
C52	AUTOMATIC	0.01	0.01	0.5	0.01	0.01	1	0.03	0.49	0	0.97	0
C53	AUTOMATIC	0	0	0	0	0	1	0.52	0.48	0	0.97	0
C54	AUTOMATIC	0	0	0	0	0	1	0.24	0.75	0	0.73	0
C55	AUTOMATIC	0	0	0	0	0	1	0.25	0.5	0.25	0.74	0
C56	AUTOMATIC	0	0	0	0	0	1	0.22	0.02	0.25	0.76	0
C57	AUTOMATIC	0	0	0	0	0	1	0.16	0.5	0.35	0	0
C58	AUTOMATIC	0	0	0	0	0	1	0.05	0.35	0	0.85	0
C59	AUTOMATIC	0	0	0	0	0	1	0.19	0.81	0	0.78	0
C6	AUTOMATIC	0.01	0.28	0.01	0.51	0.01	1	0.18	0.82	0	0.49	0
C60	AUTOMATIC	0	0	0	0	0	1	0.19	0.5	0.31	0	0
C61	AUTOMATIC	0	0	0	0	0	1	0.23	0.25	0	0.74	0
C62	AUTOMATIC	0	0	0	0	0	1	0.23	0.49	0.28	0	0
C64	AUTOMATIC	0	0	0	0	0	1	0.18	0.5	0.31	0.51	0
C65	AUTOMATIC	0	0	0	0	0	1	0.18	0.5	0.32	0.01	0
C66	AUTOMATIC	0	0	0	0	0	1	0.2	0.8	0.01	0.5	0
C67	AUTOMATIC	0	0	0	0	0	1	0.2	0.49	0.31	0	0
C68	AUTOMATIC	0	0	0	0	0	1	0.24	0.5	0.26	0.49	0
C6814	AUTOMATIC	0	0	0	0	0	1	0.59	0.1	0	0.74	0
C6815	AUTOMATIC	0	0	0	0	0	1	0.55	0.37	0.04	0.55	0
C6816	AUTOMATIC	0	0	0	0	0	1	0.54	0.17	0.25	0.22	0

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Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C69	AUTOMATIC	0	0	0	0	0	1	0.24	0.49	0.27	0	0
C7	AUTOMATIC	0.01	0.01	0.01	0.48	0.01	1	0.16	0.82	0	0.56	0
C70	AUTOMATIC	0	0	0	0	0	1	0.22	0	0	0	0
C71	AUTOMATIC	0	0	0	0	0	1	0.22	0.5	0.28	0	0
C7147	AUTOMATIC	0	0	0	0	0	1	0.16	0.13	0.3	0.53	0
C72	AUTOMATIC	0	0	0	0	0	1	0.12	0.54	0.33	0.5	0
C73	AUTOMATIC	0	0	0	0	0	1	0.12	0.5	0.38	0	0
C74	AUTOMATIC	0	0	0	0	0	1	0.09	0.87	0.04	0.49	0
C75	AUTOMATIC	0	0	0	0	0	1	0.09	0.49	0.41	0	0
C76	AUTOMATIC	0	0	0	0	0	1	0.22	0.27	0	0.75	0
C77	AUTOMATIC	0	0	0	0	0	1	0.22	0.47	0.3	0	0
C78	AUTOMATIC	0	0	0	0	0	1	0.11	0.29	0	0.77	0
C79	AUTOMATIC	0	0	0	0	0	1	0.11	0.49	0.39	0	0
C8	AUTOMATIC	0	0	0	0	0	1	0.16	0.56	0.28	0	0
C80	AUTOMATIC	0	0	0	0	0	1	0.06	0.78	0	0.01	0
C81_1	AUTOMATIC	0	0	0	0	0	1	0.22	0.5	0.29	0.5	0
C81_2	AUTOMATIC	0	0	0	0	0	1	0.22	0.02	0.29	0.74	0
C82	AUTOMATIC	0	0	0	0	0	1	0.22	0.28	0.01	0.5	0
C83	AUTOMATIC	0	0	0	0	0	1	0.22	0.48	0.3	0	0
C9	AUTOMATIC	0	0	0	0	0	1	0.05	0.66	0.29	0	0
C90	AUTOMATIC	0.01	0.01	0.06	0.01	0.01	1	0.96	0.01	0	0.75	0
C92	AUTOMATIC	0.24	0.24	0.24	0.01	0.24	1	0.07	0.82	0.1	0.1	0
C97	AUTOMATIC	0	0	0	0	0	1	0.06	0.23	0.23	0.55	0

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Table 6E: Conduits

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
_C101	0	0		0	0	0	0	0	0	0	0	0
_C102	0	0		0	0	0	0	0	0	0	0	0
_C105	0	0		0	0	0	0	0	0	0	0	0
_C107	0	0		0	0	0	0	0	0	0	0	0
C1	0	0		0	0	0	0	0	0	0	0	0
C10	0	0		0	0	0	0	0	0	0	0	0
C103	0	0		0	0	0	0	0	0	0	0	0
C103_1	0	0		0	0	0	0	0	0	0	0	0
C105	0	0		0	0	0	0	0	0	0	0	0
C107	0	0		0	0	0	0	0	0	0	0	0
C109	0	0		0	0	0	0	0	0	0	0	0
C11	0	0		0	0	0	0	0	0	0	0	0
C111	0	0		0	0	0	0	0	0	0	0	0
C115	0	0		0	0	0	0	0	0	0	0	0
C12	0	0		0	0	0	0	0	0	0	0	0
C13	0	0		0	0	0	0	0	0	0	0	0
C14	0	0		0	0	0	0	0	0	0	0	0
C141	0	0		0	0	0	0	0	0	0	0	0
C1418	0	0		0	0	0	0	0	0	0	0	0
C15	0	0		0	0	0	0	0	0	0	0	0
C155	0	0		0	0	0	0	0	0	0	0	0
C16	0	0		0	0	0	0	0	0	0	0	0
C17	0	0		0	0	0	0	0	0	0	0	0
C18	0	0		0	0	0	0	0	0	0	0	0
C19	0	0		0	0	0	0	0	0	0	0	0
C19_2	0	0		0	0	0	0	0	0	0	0	0

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Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C2	0	0		0	0	0	0	0	0	0	0	0
C20	0	0		0	0	0	0	0	0	0	0	0
C21	0	0		0	0	0	0	0	0	0	0	0
C21017	0	0		0	0	0	0	0	0	0	0	0
C21018	0	0		0	0	0	0	0	0	0	0	0
C21048	0	0		0	0	0	0	0	0	0	0	0
C21088	0	0		0	0	0	0	0	0	0	0	0
C21134	0	0		0	0	0	0	0	0	0	0	0
C21144	0	0		0	0	0	0	0	0	0	0	0
C22	0	0		0	0	0	0	0	0	0	0	0
C22143	0	0		0	0	0	0	0	0	0	0	0
C22244	0	0		0	0	0	0	0	0	0	0	0
C22267	0	0		0	0	0	0	0	0	0	0	0
C22328	0	0		0	0	0	0	0	0	0	0	0
C22348	0	0		0	0	0	0	0	0	0	0	0
C23	0	0		0	0	0	0	0	0	0	0	0
C2314	0	0		0	0	0	0	0	0	0	0	0
C24	0	0		0	0	0	0	0	0	0	0	0
C2406	0	0		0	0	0	0	0	0	0	0	0
C2414	0	0		0	0	0	0	0	0	0	0	0
C2454	0	0		0	0	0	0	0	0	0	0	0
C2489	0	0		0	0	0	0	0	0	0	0	0
C25	0	0		0	0	0	0	0	0	0	0	0
C2547	0	0		0	0	0	0	0	0	0	0	0
C2549	0	0		0	0	0	0	0	0	0	0	0
C2592	0	0		0	0	0	0	0	0	0	0	0

Hold

Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C26	0	0		0	0	0	0	0	0	0	0	0
C27	0	0		0	0	0	0	0	0	0	0	0
C28	0	0		0	0	0	0	0	0	0	0	0
C2988	0	0		0	0	0	0	0	0	0	0	0
C3	0	0		0	0	0	0	0	0	0	0	0
C30	0	0		0	0	0	0	0	0	0	0	0
C31	0	0		0	0	0	0	0	0	0	0	0
C33	0	0		0	0	0	0	0	0	0	0	0
C37	0	0		0	0	0	0	0	0	0	0	0
C38	0	0		0	0	0	0	0	0	0	0	0
C39	0	0		0	0	0	0	0	0	0	0	0
C4	0	0		0	0	0	0	0	0	0	0	0
C40	0	0		0	0	0	0	0	0	0	0	0
C41	0	0		0	0	0	0	0	0	0	0	0
C42	0	0		0	0	0	0	0	0	0	0	0
C43	0	0		0	0	0	0	0	0	0	0	0
C44	0	0		0	0	0	0	0	0	0	0	0
C45	0	0		0	0	0	0	0	0	0	0	0
C46	0	0		0	0	0	0	0	0	0	0	0
C47	0	0		0	0	0	0	0	0	0	0	0
C48	0	0		0	0	0	0	0	0	0	0	0
C49	0	0		0	0	0	0	0	0	0	0	0
C5	0	0		0	0	0	0	0	0	0	0	0
C50	0	0		0	0	0	0	0	0	0	0	0
C51	0	0		0	0	0	0	0	0	0	0	0
C52	0	0		0	0	0	0	0	0	0	0	0

Hold

Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C53	0	0		0	0	0	0	0	0	0	0	0
C54	0	0		0	0	0	0	0	0	0	0	0
C55	0	0		0	0	0	0	0	0	0	0	0
C56	0	0		0	0	0	0	0	0	0	0	0
C57	0	0		0	0	0	0	0	0	0	0	0
C58	0	0		0	0	0	0	0	0	0	0	0
C59	0	0		0	0	0	0	0	0	0	0	0
C6	0	0		0	0	0	0	0	0	0	0	0
C60	0	0		0	0	0	0	0	0	0	0	0
C61	0	0		0	0	0	0	0	0	0	0	0
C62	0	0		0	0	0	0	0	0	0	0	0
C64	0	0		0	0	0	0	0	0	0	0	0
C65	0	0		0	0	0	0	0	0	0	0	0
C66	0	0		0	0	0	0	0	0	0	0	0
C67	0	0		0	0	0	0	0	0	0	0	0
C68	0	0		0	0	0	0	0	0	0	0	0
C6814	0	0		0	0	0	0	0	0	0	0	0
C6815	0	0		0	0	0	0	0	0	0	0	0
C6816	0	0		0	0	0	0	0	0	0	0	0
C69	0	0		0	0	0	0	0	0	0	0	0
C7	0	0		0	0	0	0	0	0	0	0	0
C70	0	0		0	0	0	0	0	0	0	0	0
C71	0	0		0	0	0	0	0	0	0	0	0
C7147	0	0		0	0	0	0	0	0	0	0	0
C72	0	0		0	0	0	0	0	0	0	0	0
C73	0	0		0	0	0	0	0	0	0	0	0

Hydra

Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C74	0	0		0	0	0	0	0	0	0	0	0
C75	0	0		0	0	0	0	0	0	0	0	0
C76	0	0		0	0	0	0	0	0	0	0	0
C77	0	0		0	0	0	0	0	0	0	0	0
C78	0	0		0	0	0	0	0	0	0	0	0
C79	0	0		0	0	0	0	0	0	0	0	0
C8	0	0		0	0	0	0	0	0	0	0	0
C80	0	0		0	0	0	0	0	0	0	0	0
C81_1	0	0		0	0	0	0	0	0	0	0	0
C81_2	0	0		0	0	0	0	0	0	0	0	0
C82	0	0		0	0	0	0	0	0	0	0	0
C83	0	0		0	0	0	0	0	0	0	0	0
C9	0	0		0	0	0	0	0	0	0	0	0
C90	0	0		0	0	0	0	0	0	0	0	0
C92	0	0		0	0	0	0	0	0	0	0	0
C97	0	0		0	0	0	0	0	0	0	0	0

Verified

Table 6F: Conduits

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_C101	0	11.111	0	1
_C102	0	23.687	0	1
_C105	0	44.375	0	1
_C107	0	16.672	0	1
C1	0	80.286	0	1
C10	0	63.364	0	1
C103	0	4.382	0	1
C103_1	0	50.893	0	1
C105	0	8.964	0	1
C107	0	29.248	0	1
C109	0	80.984	0	1
C11	0	8.687	0	1
C111	0	80.426	0	1
C115	0	21.474	0	1
C12	0	14.69	0	1
C13	0	7.798	0	1
C14	0	66.141	0	1
C141	0	5.175	0	1
C1418	0	17.711	0	1
C15	0	34.942	0	1
C155	0	66.234	0	1
C16	0	14.904	0	1
C17	0	32.839	0	1
C18	0	147.118	0	1
C19	0	30.413	0	1
C19_2	0	9.938	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C2	0	143.639	0	1
C20	0	7.292	0	1
C21	0	61.898	0	1
C21017	0	8.808	0	1
C21018	0	11.283	0	1
C21048	0	13.528	0	1
C21088	0	16.208	0	1
C21134	0	11.719	0	1
C21144	0	7.334	0	1
C22	0	23.59	0	1
C22143	0	10.526	0	1
C22244	0	16.784	0	1
C22267	0	10.634	0	1
C22328	0	9.908	0	1
C22348	0	15.24	0	1
C23	0	29.838	0	1
C2314	0	2.493	0	1
C24	0	30.019	0	1
C2406	0	15.06	0	1
C2414	0	15.24	0	1
C2454	0	15.241	0	1
C2489	0	11.883	0	1
C25	0	15.666	0	1
C2547	0	12.739	0	1
C2549	0	12.941	0	1
C2592	0	8.842	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C26	0	54.176	0	1
C27	0	5.088	0	1
C28	0	29.138	0	1
C2988	0	14.82	0	1
C3	0	75.585	0	1
C30	0	13.372	0	1
C31	0	9.725	0	1
C33	0	3.894	0	1
C37	0	4.651	0	1
C38	0	6.346	0	1
C39	0	16.539	0	1
C4	0	36.353	0	1
C40	0	7.713	0	1
C41	0	7.051	0	1
C42	0	11.966	0	1
C43	0	12.41	0	1
C44	0	8.317	0	1
C45	0	37.311	0	1
C46	0	25.797	0	1
C47	0	4.255	0	1
C48	0	16.408	0	1
C49	0	64.613	0	1
C5	0	13.308	0	1
C50	0	67.039	0	1
C51	0	35.426	0	1
C52	0	131.742	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C53	0	40.957	0	1
C54	0	14.707	0	1
C55	0	6.283	0	1
C56	0	6.024	0	1
C57	0	18.673	0	1
C58	0	38.297	0	1
C59	0	10.812	0	1
C6	0	34.898	0	1
C60	0	37.396	0	1
C61	0	21.536	0	1
C62	0	20.62	0	1
C64	0	21.578	0	1
C65	0	20.515	0	1
C66	0	23.027	0	1
C67	0	19.796	0	1
C68	0	23.439	0	1
C6814	0	91.879	0	1
C6815	0	51.67	0	1
C6816	0	8.85	0	1
C69	0	16.096	0	1
C7	0	57.954	0	1
C70	0	23.672	0	1
C71	0	21.106	0	1
C7147	0	93.029	0	1
C72	0	22.939	0	1
C73	0	16.198	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C74	0	22.898	0	1
C75	0	18.316	0	1
C76	0	21.39	0	1
C77	0	22.684	0	1
C78	0	16.12	0	1
C79	0	15.492	0	1
C8	0	6.125	0	1
C80	0	25.75	0	1
C81_1	0	63.577	0	1
C81_2	0	58.913	0	1
C82	0	34.523	0	1
C83	0	6.549	0	1
C9	0	20.69	0	1
C90	0	21.427	0	1
C92	0	11.948	0	1
C97	0	8.706	0	1

Table 7A: Weirs

Name	Inlet Node	Outlet Node	Tag	Type	Height (ft)	Length (ft)	Side Slope (ft/ft)	Inlet Offset (ft)	Discharge Coeff. (CFS)	Flap Gate	End Contractions	End Coeff. (CFS)
BasinOverflowWeir	_Rt6Basin&Forebay	_Rt6Basin_OF	Zone3	TRANSVERSE	2	120	0	4	3.33	NO	0	0
C19_1	DMH-32	DMH-32_Weir		TRANSVERSE	1	1	0	0.5	3.33	NO	0	0
W1	_Rt6Basin&Forebay	_Rt6Basin_OF		TRANSVERSE	2	17	0	3	3.33	NO	0	0

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Table 7B: Weirs

Name	Can Surcharge	Coeff. Curve	Road Width (ft)	Road Surface	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
BasinOverflowWeir	YES		0	PAVED	NO	0	10/31/2018 00:00 AM	0	0	0	0
C19_1	YES		0	PAVED	NO	0.32	10/31/2018 12:23 PM	0.21	0	0	0
W1	YES		0	PAVED	NO	13.82	10/31/2018 12:07 PM	0.2	0	0	0

Table 7C: Weirs

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
BasinOverflowWeir	22.162	0	1
C19_1	3.586	0	1
W1	23.005	0	1

Table 8A: ARM Subcatchments

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S1	1010487.317	2847818.725	Zone 2		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB2	0.913	300	3.519
S10	1005708.415	2844682.934	Zone 1		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J20	0.352	300	8.406
S103_1	1007362.004	2845719.622	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J25	0.781	300	11.045
S103_2	1007058.318	2845579.838	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J1	0.636	300	14.154
S106	1011862.971	2845745.351	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH13	0.436	300	5.668
S11	1011368.787	2845042.386	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB30	0.24	300	11.124
S112	1011765.715	2845607.459	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH12	0.576	300	11.629
S117	1006645.061	2845292.582	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J8	1.28	300	7.392
S119	1011710.229	2845450.521	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB32	0.487	300	13.311

HEC

Table 8A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S12	1009155.269	2846806.185	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J28	1.163	300	11.343
S121	1006652.612	2845362.099	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J4	0.365	300	7.731
S122	1011582.402	2845423.142	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH11	0.033	300	5.762
S123_1	1011641.466	2845102.141	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB33	5.513	300	8.307
S126	1006771.027	2845326.81	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J7	0.373	300	8.112
S128_1	1011314.008	2844967.879	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB29	0.912	300	6.141
S128_3	1011439.667	2845206.557	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB27	0.082	300	5.357
S128_4	1011509.295	2845310.923	Zone 6	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	cb28	0.069	300	3.231
S13	1010995.082	2845155.655	Zone 5		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J428	9.522	300	9.391
S130	1006150.145	2845207.413	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J5	1.595	300	27.808
S135	1006040.366	2844957.721	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J13	0.89	300	15.026
S135_2	1005799.316	2844651.484	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J12	0.528	300	15.451
S135_4	1005715.768	2844640.674	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J12	0.218	300	10.886
S138	1006093.058	2844885.605	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J11	0.718	300	12.176
S14	1010073.132	2846967.657	Zone 1		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	OF-RS-13-S	8.285	300	10.506
S141	1011205.465	2844879.436	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH15	0.124	300	4.749
S2	1010278.468	2848203.067	Zone 2	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DuckPond	26.281	300	10.923
S2_1	1010537.761	2846249.488	Zone 4	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	_CourtStWetlandArea	0.379	300	16.627
S2_3	1010958.977	2846249.347	Zone 4	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB4	10.8	300	12.201
S23	1009578.801	2847171.57	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB36	0.524	300	10.193
S25	1010728.262	2847636.033	Zone 2	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH4	2.032	300	5.744
S26	1010339.143	2847226.97	Zone 3	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-10	0.546	300	3.813
S26_1	1010334.853	2847481.827	Zone 3	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-07	0.38	300	6.003
S30	1011355.912	2847415.335	Zone 2	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB104	4.405	300	11.115
S32	1010496.691	2847333.793	Zone 3	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-07	2.027	300	6.639
S33	1010881.808	2847329.337	Zone 2	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J611	8.854	300	10.761

Table 8A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S36	1011722.209	2847132.617	Zone 2	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB105	12.204	300	9.923
S46_2	1009603.012	2847123.201	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB37	0.538	300	4.621
S49_1	1010739.79	2846918.195	Zone 4	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-12	3.133	300	10.21
S49_6	1010444.732	2846453.095	Zone 4	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-14	0.451	300	8.23
S49_8	1010511.018	2846349.272	Zone 4	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-18	0.18	300	4.348
S52_2	1009925.542	2847338.791	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J30	0.249	300	3.955
S53	1011172.364	2846593.041	Zone 4	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J155	3.103	300	17.273
S6	1005494.968	2844432.915	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J22	0.279	300	8.507
S6_1	1008971.765	2846458.918	Zone 1		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J6	1.238	300	9.56
S6_3	1009439.368	2846742.738	Zone 1		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J27	4.78	300	12.857
S6_4	1009688.465	2847016.819	Zone 1		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	CB38	1.549	300	10.774
S7	1011037.519	2844670.263	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH17	0.125	300	9.111
S70_2	1010722.908	2845836.1	Zone 5	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-27	2.87	300	7.148
S75_2	1008565.796	2846294.473	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J6	1.627	300	11.794
S76_1	1011305.239	2845685.652	Zone 6	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J1364	5.302	300	12.888
S8	1005452.29	2844454.885	Zone 1		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J18	0.372	300	7.857
S80_1	1010894.296	2845731.405	Zone 5	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-28	0.578	300	4.766
S9	1011213.411	2844798.075	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH16	0.38	300	3.94
S90_1	1008157.655	2846015.314	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J17	0.138	300	5.266
S90_2	1008454.394	2846213.676	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J10	0.441	300	10.746
S97_2	1007093.128	2845499.64	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J3	0.299	300	6.44
S99_2	1007877.635	2845863.999	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J15	0.25	300	2.582
R1_1	1009851.312	2847349.892	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J31	0.487	300	6.426
R3_1	1010928.282	2845597.979	Zone 5	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-28	0.308	300	4.658
R3_3	1010998.99	2845602.639	Zone 5	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-30	0.039	300	4.658
R3_4	1011035.64	2845660.735	Zone 6	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	WinthropPond	0.788	300	4.66

Table 8A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S98_3	1011974.591	2845873.89	Zone 6	Zone 6	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	MH14	0.201	300	13.371
R4_1	1007726.109	2845836.765	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J26	2.024	300	10.977
R4_2	1007900.864	2846047.495	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	OF-RS-9-N	0.479	300	10.988
R5	1009128.388	2847062.777	Zone 1		SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J29	1.586	300	10.734
S49	1010546.598	2846694.16	Zone 4	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-13	3.721	300	9.517
S26_3	1010180.612	2847427.572	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J30	1.572	300	6.225
S26_4	1010447.729	2847688.329	Zone 3	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-03	0.733	300	6.225
S28_1	1010049.406	2847533.073	Zone 1	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	J31	0.445	300	8.722
S28_2	1010238.884	2847650.034	Zone 3	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	Rt6Drywells	0.306	300	8.722
S5_1	-7813761.169	5168224.587	Zone 5	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	DMH-32	0.67	300	5.645
S5_2	-7813851.306	5168311.825	Zone 6	WDT	SCS Dimensionless UH	2yr24hr_NOAA_3.14in	WinthropPond	0.414	300	5.645

Table 8B: ARM Subcatchments

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.002	SCS CN
S10	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S103_1	0	0.05	11.618	3	0.5	4	7	0	1.93	4.739	0.413	User entered value	5	SCS CN
S103_2	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S106	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.041	SCS CN
S11	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S112	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S117	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.198	SCS CN
S119	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

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Table 8B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S12	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	6.7	SCS CN
S121	0	0.05	11.504	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S122	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S123_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S126	0	0.05	11.514	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.008	SCS CN
S128_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S128_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S128_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S13	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	9.7	SCS CN
S130	0	0.05	12.119	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.3	SCS CN
S135	0	0.05	11.577	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_2	0	0.05	11.529	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_4	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S138	0	0.05	11.53	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S14	0	0.05	12.22	3	0.5	4	7	0	1.982	4.347	0.41	User entered value	6.698	SCS CN
S141	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S2	0	0.05	12.46	3	0.5	4	7	0	2.868	2.723	0.397	User entered value	12.8	SCS CN
S2_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S2_3	0	0.05	11.581	3	0.5	4	7	0	2.396	1.208	0.39	User entered value	6.5	SCS CN
S23	0	0.05	11.5	3	0.5	4	7	0	1.932	4.728	0.413	User entered value	5	SCS CN
S25	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	13.9	SCS CN
S26	0	0.05	12.536	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S26_1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S30	0	0.05	11.99	3	0.5	4	7	0	2.008	4.151	0.409	User entered value	7.3	SCS CN
S32	0	0.05	11.5	3	0.5	4	7	0	1.944	4.631	0.412	User entered value	5.9	SCS CN
S33	0	0.05	11.93	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	15.1	SCS CN

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Table 8B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S36	0	0.05	11.541	3	0.5	4	7	0	2.24	2.389	0.398	User entered value	24.9	SCS CN
S46_2	0	0.05	11.513	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S49_1	0	0.05	11.624	3	0.5	4	7	0	2.124	3.271	0.404	User entered value	17.9	SCS CN
S49_6	0	0.05	11.5	3	0.5	4	7	0	2.264	2.207	0.397	User entered value	5	SCS CN
S49_8	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S52_2	0	0.05	11.5	3	0.5	4	7	0	2.199	2.7	0.4	User entered value	5.001	SCS CN
S53	0	0.05	11.5	3	0.5	4	7	0	2.161	2.99	0.402	User entered value	5	SCS CN
S6	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S6_1	0	0.05	12.367	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.2	SCS CN
S6_3	0	0.05	12.239	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S6_4	0	0.05	11.509	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S7	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S70_2	0	0.05	11.504	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S75_2	0	0.05	12.11	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	8.2	SCS CN
S76_1	0	0.05	11.623	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	7.6	SCS CN
S8	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S80_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S9	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S90_1	0	0.05	12.035	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S90_2	0	0.05	11.63	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S97_2	0	0.05	11.726	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S99_2	0	0.05	11.942	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.243	SCS CN
R1_1	0	0.05	11.5	3	0.5	4	7	0	2.111	3.37	0.404	User entered value	5	SCS CN
R3_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

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Table 8B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S98_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R4_1	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	27.172	SCS CN
R4_2	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
R5	0	0.05	12.229	3	0.5	4	7	0	2.154	3.045	0.402	User entered value	5	SCS CN
S49	0	0.05	11.531	3	0.5	4	7	0	2.222	2.528	0.399	User entered value	5	SCS CN
S26_3	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.199	SCS CN
S26_4	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S28_1	0	0.05	11.846	3	0.5	4	7	0	2.268	4.014	0.407	User entered value	5	SCS CN
S28_2	0	0.05	11.846	3	0.5	4	7	0	2.268	4.014	0.407	User entered value	5	SCS CN
S5_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S5_2	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

Table 8C: ARM Subcatchments

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S1	0.2 S	0.341	85.437	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S10	0.2 S	0.143	93.311	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_1	0.2 S	0.954	67.694	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_2	0.2 S	1.069	65.171	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S106	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S11	0.2 S	0.053	97.442	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S112	0.2 S	0.172	92.078	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S117	0.2 S	0.757	72.555	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S119	0.2 S	0.263	88.363	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 8C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S12	0.2 S	1.682	54.323	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S121	0.2 S	0.479	80.683	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S122	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S123_1	0.2 S	0.167	92.274	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S126	0.2 S	0.437	82.083	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_1	0.2 S	0.069	96.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_3	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_4	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S13	0.2 S	0.79	71.684	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S130	0.2 S	2.219	47.407	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135	0.2 S	0.47	80.956	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_2	0.2 S	0.633	75.95	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_4	0.2 S	0.076	96.349	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S138	0.2 S	0.501	79.966	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S14	0.2 S	0.674	74.802	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S141	0.2 S	0.159	92.649	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2	0.2 S	1.716	53.822	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2_1	0.2 S	1.5	57.14	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2_3	0.2 S	0.628	76.108	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S23	0.2 S	0.992	66.854	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S25	0.2 S	0.429	82.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26	0.2 S	0.116	94.511	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_1	0.2 S	0.31	86.57	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S30	0.2 S	1.372	59.304	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S32	0.2 S	0.483	80.561	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S33	0.2 S	0.979	67.134	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 8C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S36	0.2 S	1.122	64.068	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S46_2	0.2 S	2.628	43.214	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_1	0.2 S	0.276	87.865	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_6	0.2 S	0.163	92.468	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_8	0.2 S	0.099	95.301	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S52_2	0.2 S	0.193	91.191	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S53	0.2 S	0.547	78.512	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6	0.2 S	0.309	86.616	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_1	0.2 S	2.361	45.862	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_3	0.2 S	1.676	54.401	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_4	0.2 S	1.215	62.204	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S7	0.2 S	0.043	97.919	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S70_2	0.2 S	0.375	84.193	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S75_2	0.2 S	0.915	68.606	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S76_1	0.2 S	0.778	71.999	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S8	0.2 S	0.327	85.953	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S80_1	0.2 S	0.133	93.776	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S9	0.2 S	0.048	97.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_1	0.2 S	0.221	90.05	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_2	0.2 S	0.712	73.746	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S97_2	0.2 S	0.51	79.69	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S99_2	0.2 S	0.148	93.108	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R1_1	0.2 S	0.679	74.65	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_1	0.2 S	0.216	90.243	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_3	0.2 S	0.106	94.961	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_4	0.2 S	0.563	78.027	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 8C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Rainfall Zone	Soil Type	Peak Rate Factor	Hydrograph Fattening	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S98_3	0.2 S	0.214	90.344			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
R4_1	0.2 S	0.703	73.983			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
R4_2	0.2 S	3.561	35.964			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
R5	0.2 S	0.652	75.409			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
S49	0.2 S	0.294	87.195			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
S26_3	0.2 S	0.46	81.302			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
S26_4	0.2 S	0.382	83.98			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
S28_1	0.2 S	0.761	72.45			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
S28_2	0.2 S	0.359	84.783			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
S5_1	0.2 S	0.07	96.61			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0
S5_2	0.2 S	1.061	65.34			Standard (483.4)		0	0	0.6	30	0.6	3	0.4		5	60	0

Table 8D: ARM Subcatchments

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S1	0.1	2017			No	0	0	0	0	3.137	1.4	1.754	0.043	1.583
S10	0.1	2017			No	0	0	0	0	3.137	0.722	2.439	0.023	0.814
S103_1	0.1	2017			No	0	0	0	0	3.137	2.452	0.692	0.015	0.453
S103_2	0.1	2017			No	0	0	0	0	3.137	2.56	0.583	0.01	0.284
S106	0.1	2017			No	0	0	0	0	3.137	0.232	2.933	0.035	1.116
S11	0.1	2017			No	0	0	0	0	3.137	0.294	2.87	0.019	0.61
S112	0.1	2017			No	0	0	0	0	3.137	0.839	2.32	0.036	1.282
S117	0.1	2017			No	0	0	0	0	3.137	2.218	0.919	0.032	0.969
S119	0.1	2017			No	0	0	0	0	3.137	1.167	1.989	0.026	0.951

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Table 8D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S12	0.1	2017			No	0	0	0	0	3.137	2.922	0.219	0.007	0.09
S121	0.1	2017			No	0	0	0	0	3.137	1.739	1.412	0.014	0.507
S122	0.1	2017			No	0	0	0	0	3.137	0.232	2.933	0.003	0.085
S123_1	0.1	2017			No	0	0	0	0	3.137	0.821	2.338	0.35	12.351
S126	0.1	2017			No	0	0	0	0	3.137	1.644	1.508	0.015	0.555
S128_1	0.1	2017			No	0	0	0	0	3.137	0.38	2.783	0.069	2.287
S128_3	0.1	2017			No	0	0	0	0	3.137	0.232	2.932	0.007	0.21
S128_4	0.1	2017			No	0	0	0	0	3.137	0.232	2.932	0.005	0.177
S13	0.1	2017			No	0	0	0	0	3.137	2.262	0.871	0.225	6.731
S130	0.1	2017			No	0	0	0	0	3.137	3.067	0.071	0.003	0.015
S135	0.1	2017			No	0	0	0	0	3.137	1.72	1.43	0.035	1.253
S135_2	0.1	2017			No	0	0	0	0	3.137	2.032	1.116	0.016	0.565
S135_4	0.1	2017			No	0	0	0	0	3.137	0.413	2.75	0.016	0.543
S138	0.1	2017			No	0	0	0	0	3.137	1.786	1.364	0.027	0.961
S14	0.1	2017			No	0	0	0	0	3.137	2.097	1.063	0.239	7.838
S141	0.1	2017			No	0	0	0	0	3.137	0.785	2.375	0.008	0.281
S2	0.1	2017			No	0	0	0	0	3.137	2.935	0.201	0.143	1.637
S2_1	0.1	2017			No	0	0	0	0	3.137	2.844	0.296	0.003	0.052
S2_3	0.1	2017			No	0	0	0	0	3.137	2.022	1.135	0.333	11.157
S23	0.1	2017			No	0	0	0	0	3.137	2.489	0.654	0.009	0.28
S25	0.1	2017			No	0	0	0	0	3.137	1.625	1.506	0.083	2.515
S26	0.1	2017			No	0	0	0	0	3.137	0.603	2.558	0.038	1.304
S26_1	0.1	2017			No	0	0	0	0	3.137	1.312	1.843	0.019	0.691
S30	0.1	2017			No	0	0	0	0	3.137	2.776	0.37	0.044	0.855
S32	0.1	2017			No	0	0	0	0	3.137	1.747	1.401	0.077	2.72
S33	0.1	2017			No	0	0	0	0	3.137	2.477	0.655	0.158	3.901

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Table 8D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S36	0.1	2017			No	0	0	0	0	3.137	2.604	0.533	0.177	3.446
S46_2	0.1	2017			No	0	0	0	0	3.137	3.118	0.019	0	0.001
S49_1	0.1	2017			No	0	0	0	0	3.137	1.208	1.932	0.164	4.591
S49_6	0.1	2017			No	0	0	0	0	3.137	0.802	2.357	0.029	1.016
S49_8	0.1	2017			No	0	0	0	0	3.137	0.523	2.638	0.013	0.439
S52_2	0.1	2017			No	0	0	0	0	3.137	0.921	2.238	0.015	0.539
S53	0.1	2017			No	0	0	0	0	3.137	1.878	1.271	0.107	3.845
S6	0.1	2017			No	0	0	0	0	3.137	1.308	1.846	0.014	0.508
S6_1	0.1	2017			No	0	0	0	0	3.137	3.089	0.048	0.002	0.008
S6_3	0.1	2017			No	0	0	0	0	3.137	2.92	0.219	0.028	0.384
S6_4	0.1	2017			No	0	0	0	0	3.137	2.675	0.466	0.02	0.471
S7	0.1	2017			No	0	0	0	0	3.137	0.241	2.922	0.01	0.32
S70_2	0.1	2017			No	0	0	0	0	3.137	1.493	1.66	0.129	4.711
S75_2	0.1	2017			No	0	0	0	0	3.137	2.411	0.737	0.033	0.939
S76_1	0.1	2017			No	0	0	0	0	3.137	2.246	0.913	0.132	3.975
S8	0.1	2017			No	0	0	0	0	3.137	1.36	1.794	0.018	0.659
S80_1	0.1	2017			No	0	0	0	0	3.137	0.676	2.484	0.039	1.354
S9	0.1	2017			No	0	0	0	0	3.137	0.271	2.894	0.03	0.969
S90_1	0.1	2017			No	0	0	0	0	3.137	1.022	2.134	0.008	0.287
S90_2	0.1	2017			No	0	0	0	0	3.137	2.155	0.992	0.012	0.411
S97_2	0.1	2017			No	0	0	0	0	3.137	1.803	1.346	0.011	0.395
S99_2	0.1	2017			No	0	0	0	0	3.137	0.741	2.414	0.016	0.571
R1_1	0.1	2017			No	0	0	0	0	3.137	2.105	1.042	0.014	0.481
R3_1	0.1	2017			No	0	0	0	0	3.137	1.005	2.152	0.018	0.645
R3_3	0.1	2017			No	0	0	0	0	3.137	0.558	2.604	0.003	0.094
R3_4	0.1	2017			No	0	0	0	0	3.137	1.908	1.241	0.027	0.951

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Table 8D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S98_3	0.1	2017			No	0	0	0	0	3.137	0.996	2.161	0.012	0.422
R4_1	0.1	2017			No	0	0	0	0	3.137	2.142	0.996	0.055	1.271
R4_2	0.1	2017			No	0	0	0	0	3.137	3.137	0	0	0
R5	0.1	2017			No	0	0	0	0	3.137	2.063	1.085	0.047	1.642
S49	0.1	2017			No	0	0	0	0	3.137	1.262	1.893	0.191	6.942
S26_3	0.1	2017			No	0	0	0	0	3.137	1.697	1.44	0.061	1.95
S26_4	0.1	2017			No	0	0	0	0	3.137	1.509	1.644	0.033	1.192
S28_1	0.1	2017			No	0	0	0	0	3.137	2.223	0.923	0.011	0.379
S28_2	0.1	2017			No	0	0	0	0	3.137	1.449	1.704	0.014	0.516
S5_1	0.1	2017			No	0	0	0	0	3.137	0.385	2.778	0.051	1.678
S5_2	0.1	2017			No	0	0	0	0	3.137	2.553	0.59	0.007	0.189

Table 8E: ARM Subcatchments

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S1	0.559	315.069	3688.787	1
S10	0.777	269.666	1423.459	1
S103_1	0.22	377.028	3159.303	1
S103_2	0.186	295.706	2574.745	1
S106	0.935	233.481	1631.88	1
S11	0.915	168.535	969.45	1
S112	0.74	307.634	2332.704	1
S117	0.293	712.861	5180.467	1
S119	0.634	179.431	1969.813	1

Table 8E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S12	0.07	494.459	4707.633	1
S121	0.45	270.8	1476.259	1
S122	0.935	59.644	132.225	1
S123_1	0.745	668.642	22309.393	1
S126	0.481	304.22	1500.539	1
S128_1	0.887	362.657	3683.22	1
S128_3	0.935	88.73	333.025	1
S128_4	0.935	131.285	280.734	1
S13	0.277	895.981	38534.838	1
S130	0.023	622.887	6453.473	1
S135	0.456	370.13	3603.291	1
S135_2	0.356	315.527	2135.183	1
S135_4	0.877	194.92	883.385	1
S138	0.435	345.481	2904.866	1
S14	0.339	796.88	33566.433	1
S141	0.757	100.226	495.075	1
S2	0.064	1627.441	106358.672	1
S2_1	0.094	157.843	1534.804	1
S2_3	0.362	1284.924	43708.974	1
S23	0.208	289.85	2122.072	1
S25	0.48	572.013	8217.123	1
S26	0.815	226.137	2209.877	1
S26_1	0.587	210.057	1536.428	1
S30	0.118	617.351	17821.744	1
S32	0.447	756.561	8203.518	1
S33	0.209	1019.231	35810.985	1

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Table 8E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S36	0.17	1284.844	49364.997	1
S46_2	0.006	317.357	1711.653	1
S49_1	0.616	824.311	12680.818	1
S49_6	0.751	195.824	1823.61	1
S49_8	0.841	121.828	726.955	1
S52_2	0.713	208.657	1007.1	1
S53	0.405	693.413	12557.385	1
S6	0.589	201.685	1127.756	1
S6_1	0.015	349.322	5010.388	1
S6_3	0.07	667.94	19372.264	1
S6_4	0.149	354.418	6315.075	1
S7	0.932	129.15	502.961	1
S70_2	0.529	717.708	11615.95	1
S75_2	0.235	1002.106	6583.03	1
S76_1	0.291	859.132	21455.902	1
S8	0.572	242.966	1506.778	1
S80_1	0.792	242.097	2340.437	1
S9	0.923	211.337	1535.98	1
S90_1	0.68	153.485	557.903	1
S90_2	0.316	338.375	1784.976	1
S97_2	0.429	294.868	1210.755	1
S99_2	0.77	267.109	928.72	1
R1_1	0.332	234.206	1969.851	1
R3_1	0.686	147.113	1245.434	1
R3_3	0.83	49.68	159.372	1
R3_4	0.395	353.112	3185.744	1

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Table 8E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S98_3	0.689	178.953	814.244	1
R4_1	0.317	785.818	8199.973	1
R4_2	0	257.642	1939.276	1
R5	0.346	347.858	6416.274	1
S49	0.603	673.495	15059.147	2
S26_3	0.459	327.093	6360.744	1
S26_4	0.524	358.119	2966.598	1
S28_1	0.294	229.348	1802.078	1
S28_2	0.543	166.11	1238.128	1
S5_1	0.886	324.692	2712.267	1
S5_2	0.188	258.975	1674.737	1

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PCSWMM Report

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Proposed

Model ShankPainter_PR_10yr24hr_2024.03.17.inp

Apex Companies, LLC

March 30, 2024

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Table 7C: Outfalls 89
Table 7D: Outfalls 90
Table 8A: Weirs 90
Table 8B: Weirs 91
Table 8C: Weirs 91

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Summary 1: Options

Name	ShankPainter_PR_10yr24hr_2024.03.17
Flow Units	CFS
Infiltration method	Curve Number
Flow routing method	Dynamic Wave
Link offsets defined by	Depth
Allow ponding	No
Skip steady flow periods	No
Inertial dampening	Full
Define supercritical flow by	Both
Force Main Equation	H-W
Variable time step	On
Adjustment factor (%)	75
Conduit lengthening (s)	0
Minimum surface area (ft²)	0.1
Starting date	Oct-31-2018 12:00:00 AM
Ending date	Nov-2-2018 12:00:00 AM
Duration of simulation (hours)	48
Antecedent dry days (days)	0
Rain interval (h:mm)	0:06
Report time step (h:mm:ss)	00:01:00
Wet time step (h:mm:ss)	00:05:00
Dry time step (h:mm:ss)	00:05:00
Routing time step (s)	0.5
Minimum time step used (s)	0.1
Average time step used (s)	0.5
Minimum conduit slope	0
Ignore rainfall/runoff	No
Ignore snow melt	No
Ignore groundwater	No
Ignore flow routing	No
Ignore water quality	No
Report average results	No

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Summary 2: Model inventory

Name	ShankPainter_PR_10yr24hr_2024.03.17
Raingages	3
Subcatchments	0
Aquifers	0
Snowpacks	0
RDII hydrographs	0
Junction nodes	1966
Outfall nodes	351
Flow divider nodes	0
Storage unit nodes	8
Conduit links	5488
Pump links	2
Orifice links	64
Weir links	3
Outlet links	0
Treatment units	0
Transects	1
Control rules	0
Pollutants	0
Land Uses	0
Control Curves	0
Diversion Curves	0
Pump Curves	3
Rating Curves	0
Shape Curves	0
Storage Curves	17
Tidal Curves	0
Weir Curves	0
Time Series	4
Time Patterns	0

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Summary 3: Model complexity

Name	ShankPainter_PR_10yr24hr_2024.03.17
Subcatchments	n/a
Groundwater	n/a
Aquifers	n/a
Snowpacks	n/a
RDII hydrographs	n/a
Junction nodes	4017
Outfall nodes	351
Flow divider nodes	n/a
Storage unit nodes	36
Conduit links	32838
Pump links	4
Orifice links	256
Weir links	12
Outlet links	n/a
Transect	3
Pollutants	n/a
Land Uses	n/a
Model complexity (total uncertain input parameters)	37517

Summary 4: Node statistics

Name	ShankPainter_PR_10yr24hr_2024.03.17
Max. ground elev. (ft)	81.527
Min. ground elev. (ft)	4.5
Max. invert elev. (ft)	52.558
Min. invert elev. (ft)	-13
Max. depth (ft)	30
Min. depth (ft)	0

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Summary 5: Conduit statistics

Name	ShankPainter_PR_10yr24hr_2024.03.17
Max. roughness	0.4
Min. roughness	0.01
Max. entry loss coef.	0.5
Min. entry loss coef.	0
Max. exit loss coef.	0
Min. exit loss coef.	0
Max. avg. loss coef.	0.5
Min. avg. loss coef.	0
Max. length (ft)	482.605
Min. length (ft)	5.84
Total length (ft)	131014.678
Max. slope (ft/ft)	2.0301
Min. slope (ft/ft)	-0.6074

Summary 6: Conduit Inventory

Name	ShankPainter_PR_10yr24hr_2024.03.17
Open Rectangular (ft)	121870.74
Circular (ft)	9143.938

Summary 7: Pipe inventory

Name	ShankPainter_PR_10yr24hr_2024.03.17
Max. pipe diameter (ft)	2
Min. pipe diameter (ft)	0.833
Total 12” pipe length (ft)	5385.936
Total 15” pipe length (ft)	1553.518
Total 18” pipe length (ft)	1235.844
Total 24” pipe length (ft)	756.63
Total other pipe length (ft)	212.01
Total pipe length (ft)	9143.938

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Summary 8: Flow routing continuity

Name	ShankPainter_PR_10yr24hr_2024.03.17
Dry weather inflow (MG)	0.000
Wet weather inflow (MG)	0.000
Groundwater inflow (MG)	0.000
RDII inflow (MG)	0.000
External inflow (MG)	7.449
External outflow (MG)	2.252
Flooding loss (MG)	1.325
Evaporation loss (MG)	0.000
Exfiltration loss (MG)	0.317
Initial stored volume (MG)	0.002
Final stored volume (MG)	3.556
Continuity error (%)	0.020

Summary 9: Results statistics

Name	ShankPainter_PR_10yr24hr_2024.03.17
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	18.85
Num. nodes surcharged	8
Max. node surcharge duration (hours)	1.05
Max. node height above crown (ft)	7.705
Min. node depth below rim (ft)	-1.16
Num. nodes flooded	3
Max. node flooding duration (hours)	48
Max. node flood volume (MG)	0.767
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	0
Max. storage volume (1000 ft³)	151.481
Max. storage percent full (%)	100
Max. outfall flow frequency (%)	76.67
Max. outfall peak flow (cfs)	22.9
Max. outfall total volume (MG)	0.674
Total outfall volume (MG)	2.520
Max. link peak flow (cfs)	20.41
Max. link peak velocity (ft/s)	14.35
Min. link peak velocity (ft/s)	0

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Summary 9: Results statistics (continued...)

Name	ShankPainter_PR_10yr24hr_2024.03.17
Num. conduits surcharged	56
Max. conduit surcharge duration (hours)	45.24
Max. conduit capacity limited duration (hours)	1.8

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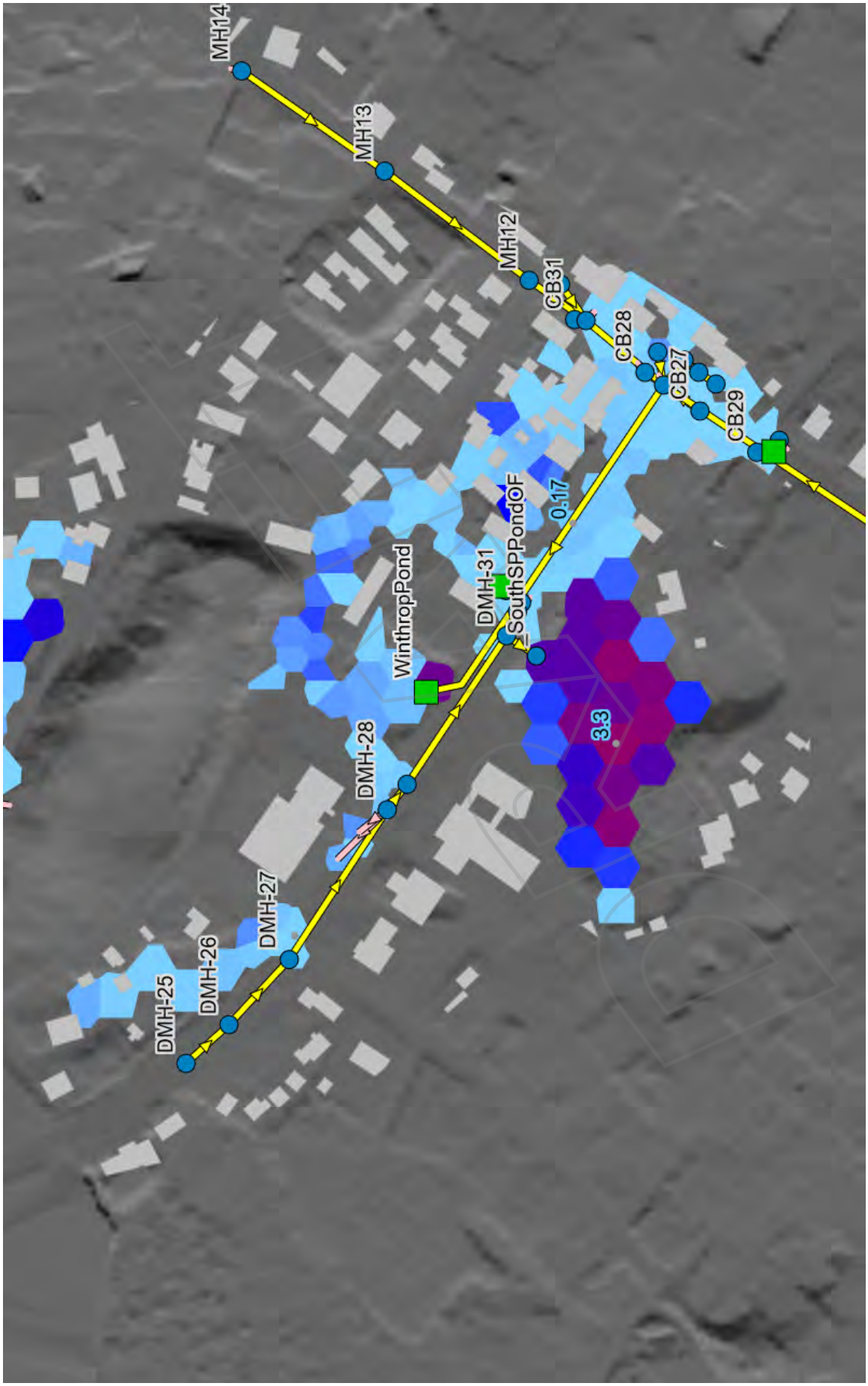


Figure 1: South Shank Painter

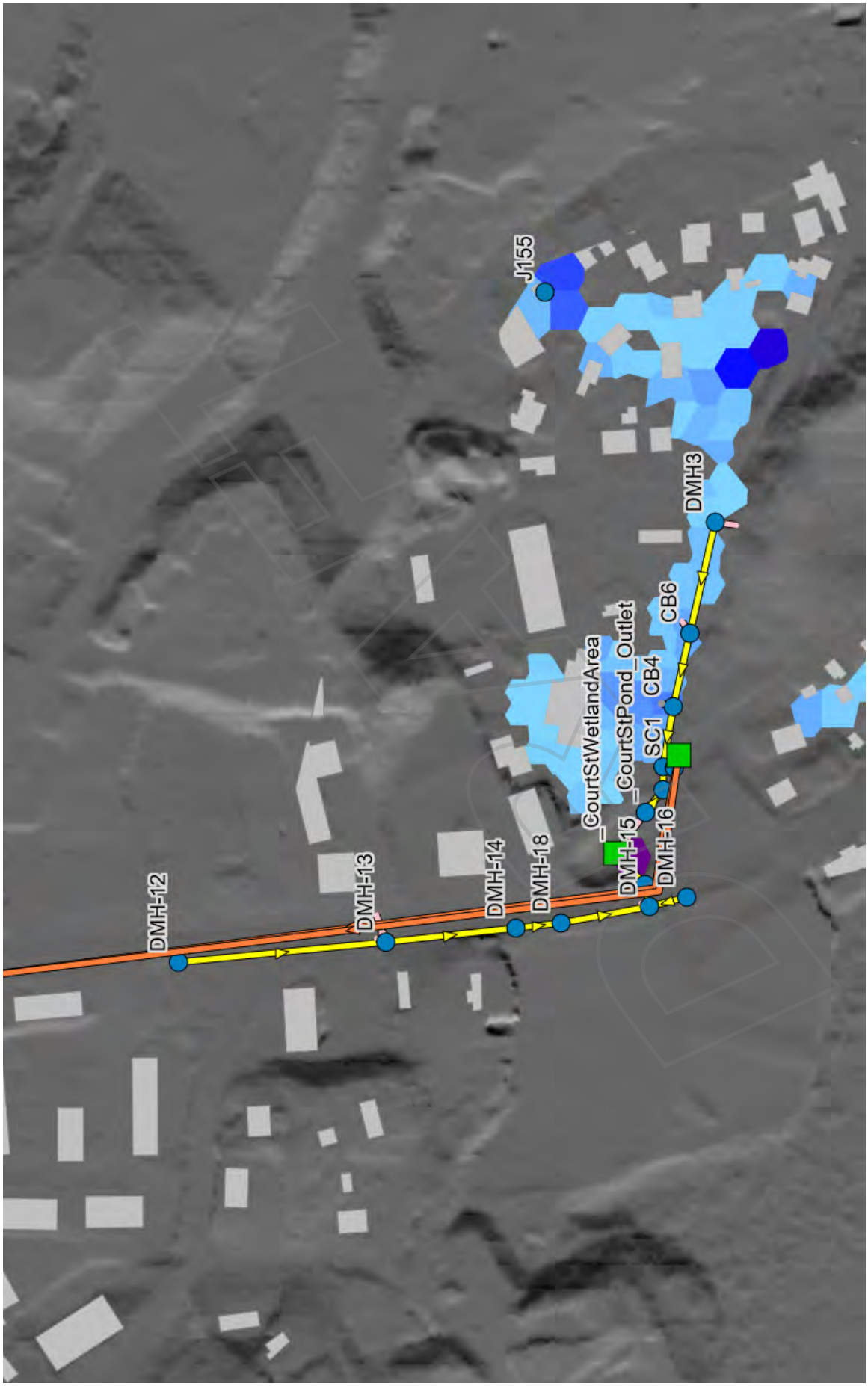


Figure 2: Court Street

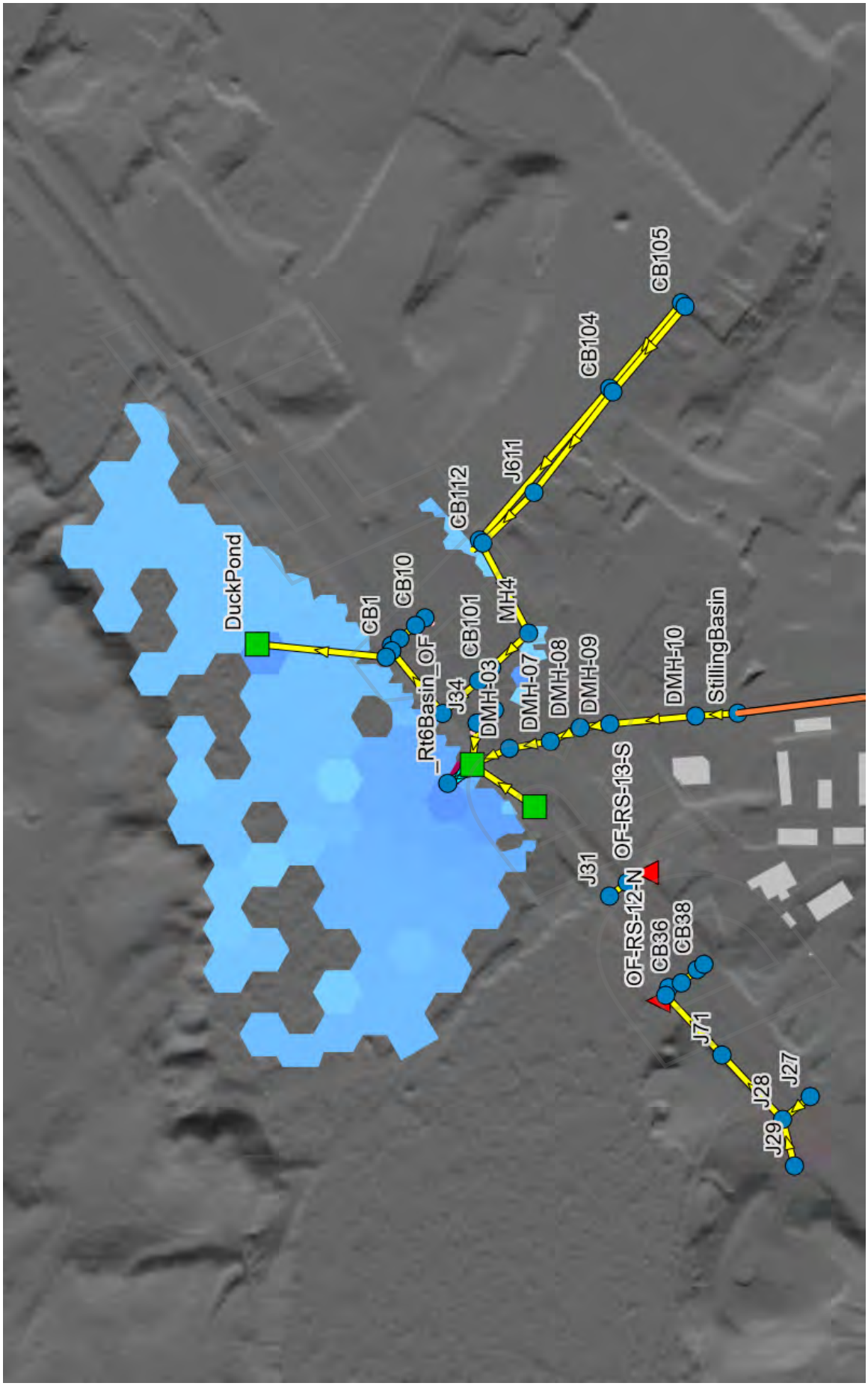


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

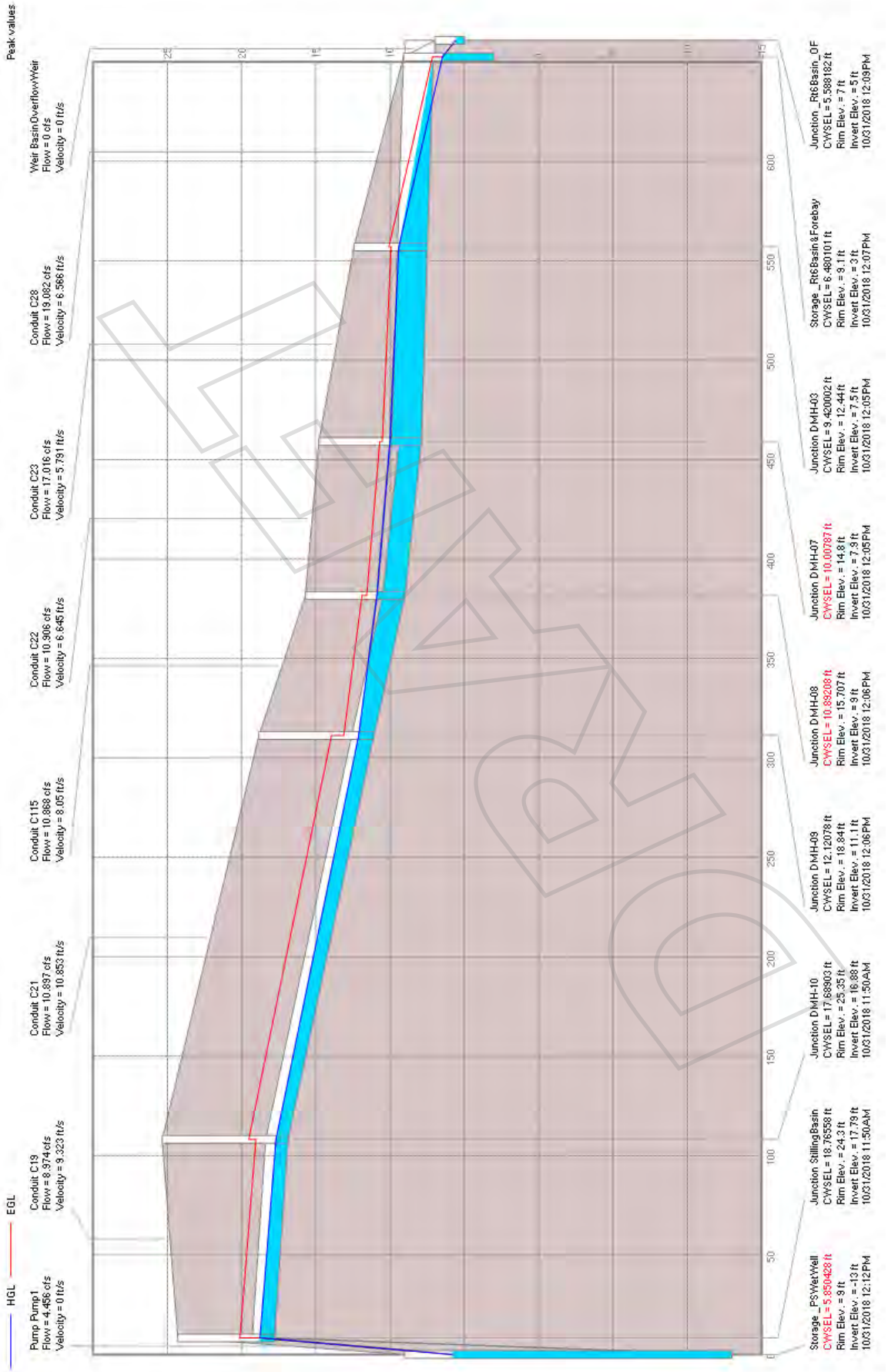


Figure 4: PS to North Outfall

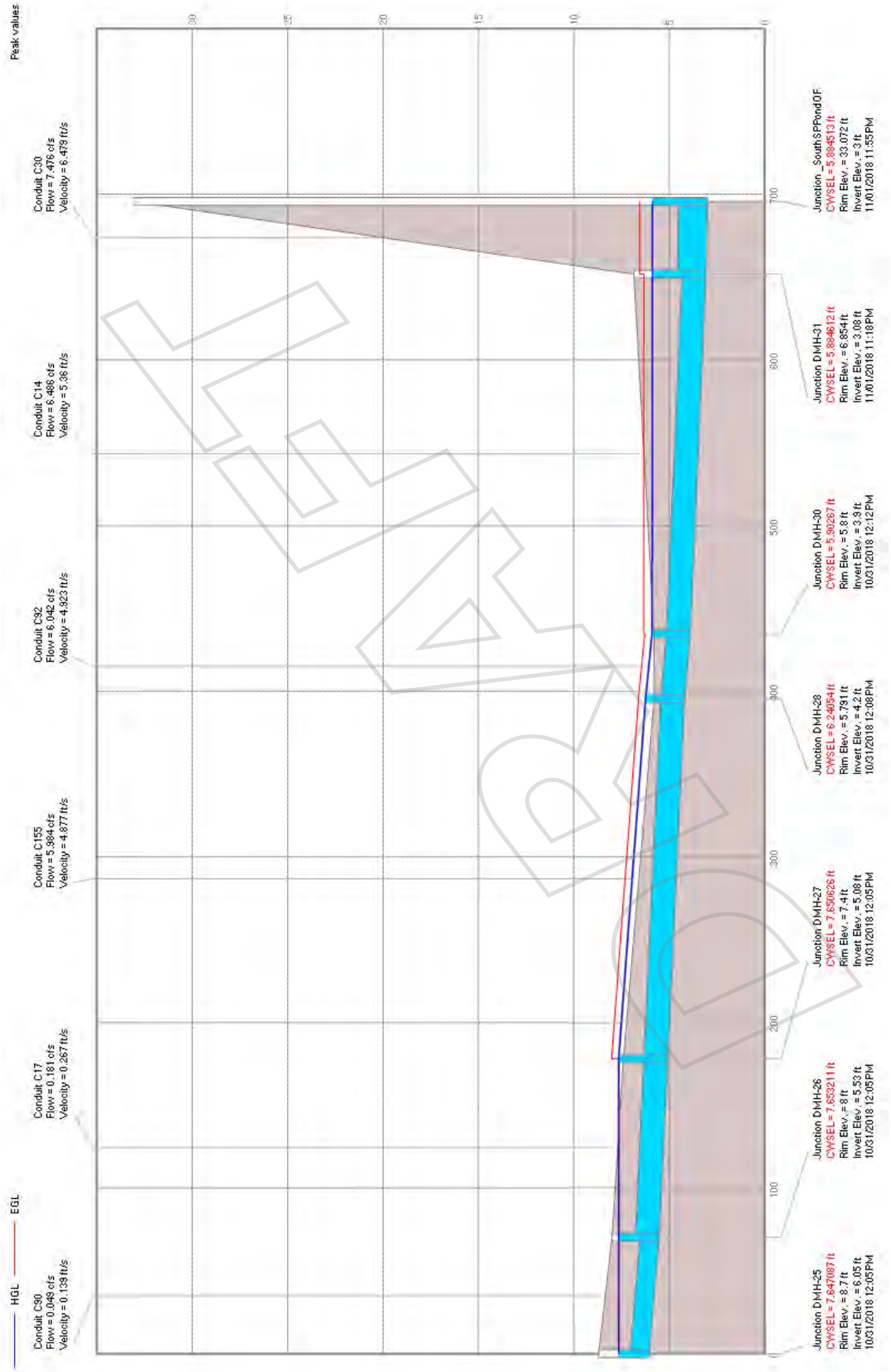


Figure 5: South Shank Painter

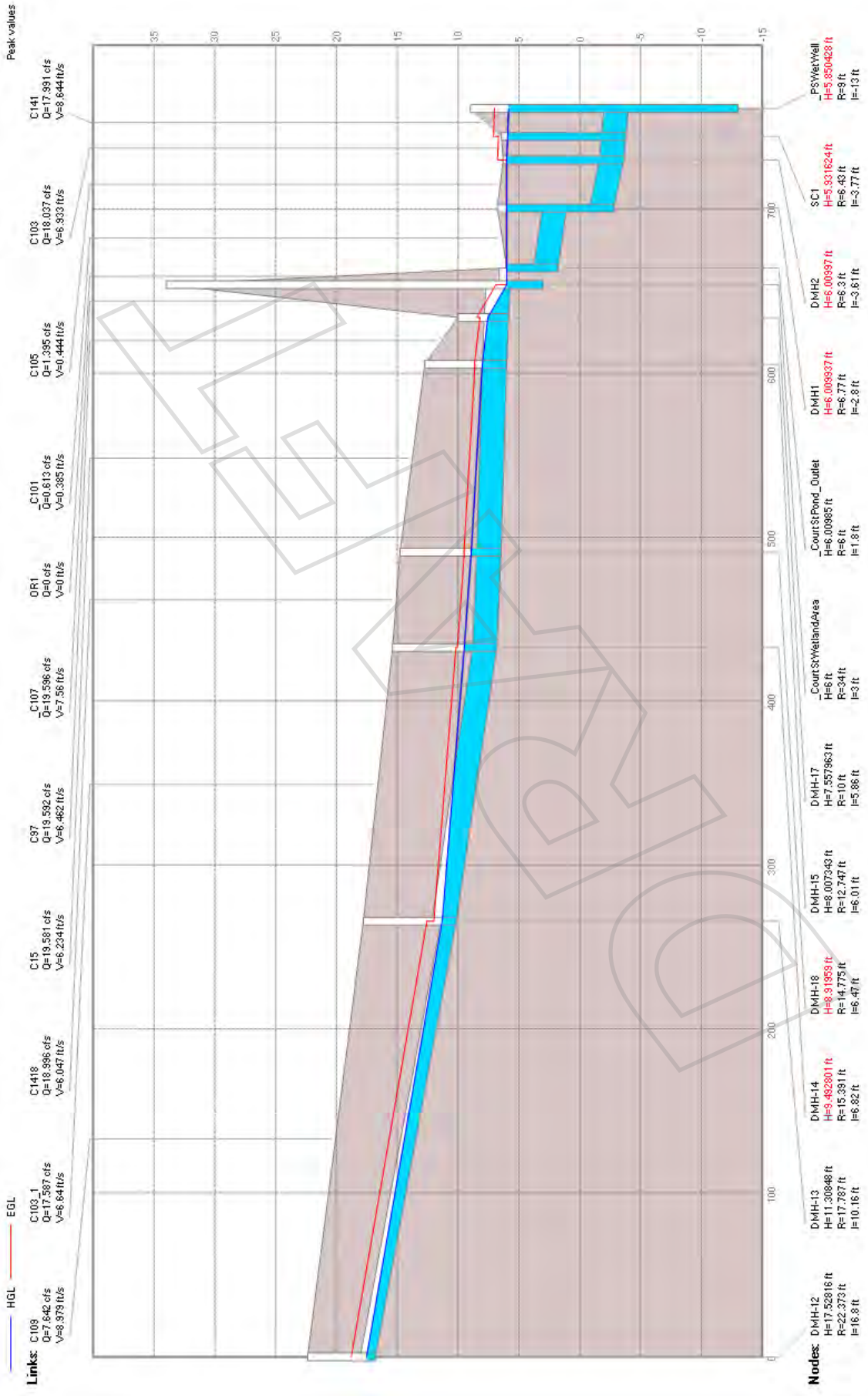


Figure 6: Shank Painter to Court St PS

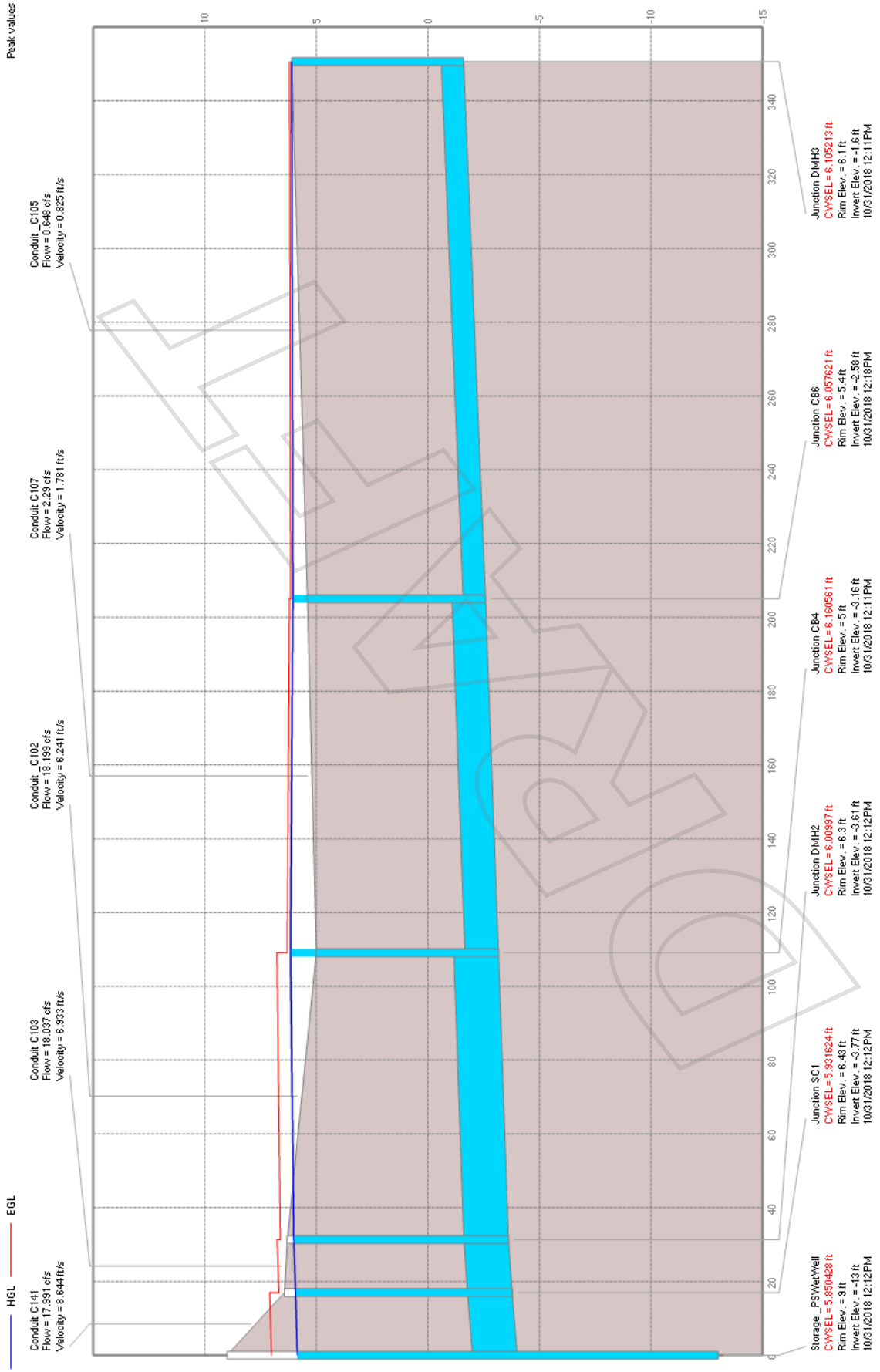


Figure 7: Court Street

Table 1A: Junctions tag not 2D

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
_CourtStPond_Outlet	1010604.363	2846204.755	Connect2D_MH	NO	NO	1.8	6	4.2	0	30	0	0
_Rt6Basin_OF	1010218.269	2847827.623	Zone3	NO	NO	5	5	0	0	0	0	0
_SouthSPPondOF	1011152.274	2845449.417	Zone5	NO	NO	3	33	30	0	0	0	0
CB1	1010543.4	2847960.354	Connect2D_MH	NO	NO	5.58	11.33	5.75	0	30	0	0
CB10	1010608.483	2847881.463	Connect2D_MH	NO	NO	6.36	11.16	4.8	0	30	0	0
CB101	1010490.895	2847724.25	Connect2D_MH	NO	NO	6.58	12.18	5.6	0	30	0	0
CB104	1011149.472	2847446.085		NO	NO	11.53	15.969	4.439	0	50	0	0
CB105	1011351.247	2847276.782		NO	NO	17.62	19.674	2.054	0	50	0	0
CB112	1010791.703	2847752.789		NO	NO	8.98	12.818	3.838	0	50	0	0
CB2	1010559.723	2847940.655	Connect2D_MH	NO	NO	6.08	11.13	5.05	0	30	0	0
CB27	1011449.616	2845250.949	Connect2D_MH	NO	NO	8	10.039	2.039	0	30	0	0
CB28	1011496.541	2845317.631	Connect2D_MH	NO	NO	5.5	9.25	3.75	0	30	0	0
CB29	1011399.511	2845181.95	Connect2D_MH	NO	NO	11.88	14.18	2.3	0	30	0	0
CB3	1010590.535	2847903.6	Connect2D_MH	NO	NO	6.13	11.23	5.1	0	30	0	0
CB30	1011414.192	2845154.644	Connect2D_MH	NO	NO	12.37	15.17	2.8	0	30	0	0
CB31	1011560.681	2845403.096	Connect2D_MH	NO	NO	8.85	11.7	2.85	0	30	0	0
CB32	1011603.491	2845420.161	Connect2D_MH	NO	NO	8.21	10.91	2.7	0	30	0	0
CB33	1011521.313	2845302.115	Connect2D_MH	NO	NO	5.55	9.05	3.5	0	30	0	0
CB35	1009736.842	2847306.934		NO	NO	6.76	12.09	5.33	0	50	0	0
CB36	1009747.672	2847276.924		NO	NO	7	12.09	5.09	0	50	0	0
CB37	1009778.85	2847240.103		NO	NO	7.23	12.04	4.81	0	50	0	0
CB38	1009791.611	2847223.915		NO	NO	7.85	12.04	4.19	0	50	0	0
CB4	1010739.258	2846169.508	Connect2D_MHs	NO	NO	-3.16	5	8.16	0	30	0	0
CB6	1010832.831	2846148.26	Connect2D_MHs	NO	NO	-2.58	5.4	7.98	0	30	0	0
DMH-03	1010300.442	2847682.232	Connect2D_MH	NO	NO	7.5	12.44	4.94	0	30	0	0
DMH-06	1010391.083	2847717.435	Connect2D_MH	NO	NO	9.1	13.37	4.27	0	30	0	0

Table 1A: Junctions tag not 2D (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
DMH-07	1010317.02	2847585.758	Connect2D_MH	NO	NO	7.9	14.8	6.9	0	30	0	0
DMH-08	1010349.802	2847515.652	Connect2D_MH	NO	NO	9	15.707	6.707	0	30	0	0
DMH-09	1010358.138	2847445.696	Connect2D_MH	NO	NO	11.1	18.84	7.74	0	30	0	0
DMH1	1010633.219	2846182.484		NO	NO	-2.8	6.77	9.57	0	0	0	0
DMH-10	1010376.899	2847243.495	Connect2D_MH	NO	NO	16.88	25.35	8.47	0	30	0	0
DMH-12	1010413.132	2846800.679	Connect2D_SPCourt	NO	NO	16.8	22.373	5.573	0	30	0	0
DMH-13	1010438.795	2846536.234	Connect2D_SPCourt	NO	NO	10.16	17.456	7.296	0	30	0	0
DMH-14	1010456.768	2846370.239	Connect2D_SPCourt	NO	NO	6.82	15.391	8.571	0	30	0	0
DMH-15	1010484.409	2846199.833	Connect2D_SPCourt	NO	NO	6.01	12.747	6.737	0	30	0	0
DMH-16	1010496.227	2846152.386	Connect2D_SPCourt	NO	NO	6.4	11.736	5.336	0	30	0	0
DMH-17	1010512.398	2846205.536	Zone4	NO	NO	5.86	10	4.14	0	30	0	0
DMH-18	1010463.221	2846312.494	Connect2D_SPCourt	NO	NO	6.47	14.775	8.305	0	30	0	0
DMH2	1010662.63	2846182.442	Connect2D_MHs	NO	NO	-3.61	6.3	9.91	0	30	0	0
DMH-25	1010657.414	2845874.873	Connect2D_MHs	NO	NO	6.05	8.7	2.65	0	30	0	0
DMH-26	1010704.509	2845822.687	Connect2D_MHs	NO	NO	5.53	8	2.47	0	30	0	0
DMH-27	1010783.602	2845749.536	Connect2D_MHs	NO	NO	5.08	7.4	2.32	0	30	0	0
DMH-28	1010965.439	2845630.575	Connect2D_MHs	NO	NO	4.2	5.56	1.36	0	30	0	0
DMH3	1010974.762	2846115.859	Connect2D_MHs	NO	NO	-1.6	6.1	7.7	0	30	0	0
DMH-30	1010996.302	2845606.408	Connect2D_MHs	NO	NO	3.9	5.8	1.9	0	30	0	0
DMH-31	1011176.719	2845485.848	Connect2D_MHs	NO	NO	3.08	6.854	3.774	0	30	0	0
DMH-32	1011217.088	2845467.438	Connect2D_MHs	NO	NO	4.48	6.93	2.45	0	30	0	0
DMH-32_Weir	1011206.384	2845472.32		NO	NO	4.416	6.91	2.494	0	0	0	0
J1	1006841.74	2845465.493		NO	NO	27.4	32.9	5.5	0	50	0	0
J10	1008672.424	2846345.08		NO	NO	31	36.6	5.6	0	50	0	0
J11	1005923.53	2844777.21		NO	NO	21	26.115	5.115	0	50	0	0
J1145	1010743.392	2846184.348	2D_label	NO	NO	5.012	35.012	30	0	0	0	0

Table 1A: Junctions tag not 2D (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
J12	1005617.671	2844526.538		NO	NO	16.5	21.2	4.7	0	50	0	0
J13	1005898.8	2844802.636		NO	NO	20.7	25.178	4.478	0	50	0	0
J1334	1010812.392	2845742.688	2D_label	NO	NO	6.915	36.915	30	0	0	0	0
J14	1007660.717	2845841.779		NO	NO	33	38.2	5.2	0	50	0	0
J15	1007693.105	2845773.999		NO	NO	33.2	38.2	5	0	50	0	0
J155	1011268.42	2846333.211	Connect2D_Direct	NO	NO	7.185	7.185	0	0	0	0	0
J1574	1011313.392	2845404.948	2D_label	NO	NO	7.865	37.865	30	0	0	0	0
J16	1008017.631	2846022.698		NO	NO	35	40.6	5.6	0	50	0	0
J17	1008052.712	2845956.117		NO	NO	35.6	40.617	5.017	0	50	0	0
J18	1005326.069	2844318.463		NO	NO	13.74	17.97	4.23	0	50	0	0
J2	1009033.294	2846722.781		NO	NO	21.4	27.8	6.4	0	50	0	0
J20	1005571.622	2844576.409		NO	NO	16	21.2	5.2	0	50	0	0
J22	1005435.367	2844345.713		NO	NO	14.5	19	4.5	0	50	0	0
J23	1005396.081	2844465.056		NO	NO	8	13.349	5.349	0	50	0	0
J25	1007203.876	2845643.62		NO	NO	30.5	35.3	4.8	0	50	0	0
J26	1007233.433	2845579.973		NO	NO	30.1	35.3	5.2	0	50	0	0
J27	1009479.713	2846973.226		NO	NO	13	18	5	0	50	0	0
J28	1009425.906	2847038.355		NO	NO	13.18	18.9	5.72	0	50	0	0
J29	1009316.153	2847010.384		NO	NO	13.55	21.71	8.16	0	50	0	0
J3	1006870.603	2845395.681		NO	NO	27.7	32.743	5.043	0	50	0	0
J30	1009984.72	2847404.505	Connect2D_MH	NO	NO	4.8	9.3	4.5	0	30	0	0
J31	1009952.378	2847446.349	Connect2D_MH	NO	NO	5.1	9.4	4.3	0	30	0	0
J32	1009718.364	2847313.955		NO	NO	5.5	9.8	4.3	0	50	0	0
J34	1010360.502	2847758.742	Connect2D_MH	NO	NO	7.3	11.25	3.95	0	30	0	0
J4	1006494.893	2845267.078		NO	NO	25.7	30.676	4.976	0	50	0	0
J428	1011045.896	2845352.789	2D_label	NO	NO	2.588	32.588	30	0	0	0	0

PRELIMINARY

Table 1A: Junctions tag not 2D (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
J445	1011141.216	2847438.472		NO	NO	15.852	15.852	0	0	0	0	0
J5	1006199.682	2845072.656		NO	NO	23.5	28.576	5.076	0	50	0	0
J564	1010784.775	2847744.961		NO	NO	12.788	12.788	0	0	0	0	0
J6	1009085.26	2846666.103		NO	NO	22	27.428	5.428	0	50	0	0
J611	1010904.043	2847624.504		NO	NO	13.624	13.624	0	0	0	0	0
J66	1011342.74	2847268.156		NO	NO	19.557	19.557	0	0	0	0	0
J7	1006533.642	2845207.831		NO	NO	24	30.512	6.512	0	50	0	0
J71	1009577.703	2847181.403		NO	NO	9.194	14.177	4.983	0	30	0	0
J8	1006239.797	2845014.495		NO	NO	22.8	28.379	5.579	0	50	0	0
J9	1008626.945	2846408.03		NO	NO	32	36.8	4.8	0	50	0	0
MH1	1010530.644	2847959.58	Connect2D_MH	NO	NO	4.73	10.954	6.224	0	30	0	0
MH10	1011511.543	2845270.131	Connect2D_MH	NO	NO	8.24	10.04	1.8	0	30	0	0
MH11	1011559.458	2845389.196	Connect2D_MH	NO	NO	8	11.188	3.188	0	30	0	0
MH12	1011608.36	2845458.27	Connect2D_MH	NO	NO	12	15.157	3.157	0	30	0	0
MH13	1011741.006	2845633.705	Connect2D_MH	NO	NO	24	28.74	4.74	0	30	0	0
MH14	1011862.65	2845807.307	Connect2D_MH	NO	NO	31	35.203	4.203	0	30	0	0
MH15	1011240.734	2844935.933	Connect2D_MH	NO	NO	25	30.512	5.512	0	30	0	0
MH16	1011171.126	2844842.863	Connect2D_MH	NO	NO	25.5	30.676	5.176	0	30	0	0
MH17	1011090.371	2844735.468	Connect2D_MH	NO	NO	28.44	32.448	4.008	0	30	0	0
MH18	1011481.215	2845295.06	Connect2D_MH	NO	NO	5.3	8.957	3.657	0	30	0	0
MH2	1010382.993	2847839.795	Connect2D_MH	NO	NO	5.58	11.867	6.287	0	30	0	0
MH3	1010459.751	2847754.847	Connect2D_MH	NO	NO	6.08	12.069	5.989	0	30	0	0
MH4	1010572.351	2847637.139	Connect2D_MH	NO	NO	7.83	12.009	4.179	0	30	0	0
MH8	1011482.438	2845231.488	Connect2D_MH	NO	NO	8.21	10.51	2.3	0	30	0	0
MH9	1011496.673	2845252.412	Connect2D_MH	NO	NO	8.1	10.1	2	0	30	0	0
OF-SP-1-WJ	1010515.721	2847973.034	Zone2	NO	NO	4.67	4.67	0	0	0	0	0

Table 1A: Junctions tag not 2D (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
SC1	1010661.294	2846168.131		NO	NO	-3.77	6.43	10.2	0	0	0	0
SC-1	1011231.654	2845486.414	Connect2D_MHs	NO	NO	4.38	6.9	2.52	0	30	0	0
StillingBasin	1010383.704	2847143.951	Connect2D_MH	NO	NO	17.79	24.3	6.51	0	30	0	0

Table 1B: Junctions tag not 2D

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
_CourtStPond_Outlet			1	0						0	0.07	4.22	6.02
_Rt6Basin_OF			1	0						0	0.17	0.59	5.59
_SouthSPPondOF			1	0						0	2.1	2.88	5.88
CB1			1	0						0	0.03	0.62	6.2
CB10			1	0						0	0	0.36	6.72
CB101			1	0						0	0.17	2.7	9.28
CB104			1	0						0	0.29	4.77	16.3
CB105			1	0						0	0.11	2.45	20.07
CB112			1	0						0	0.24	4.15	13.13
CB2			1	0						0	0.04	0.64	6.72
CB27			1	0						0	0.02	1.09	9.09
CB28			1	0						0	0.08	3.58	9.08
CB29			1	0						0	2.66	3.28	15.16
CB3			1	0						0	0.02	0.59	6.72
CB30			1	0						0	2.22	2.84	15.21
CB31			1	0						0	0.02	2.49	11.34
CB32			1	0						0	0.06	3.29	11.5

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Table 1B: Junctions tag not 2D (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
CB33			1	0						0	0.2	4.34	9.89
CB35			1	0						0	0.03	1.37	8.13
CB36			1	0						0	0.05	1.36	8.36
CB37			1	0						0	0.04	1.28	8.51
CB38			1	0						0	0.03	0.76	8.61
CB4			1	0						0	0.28	9.32	6.16
CB6			1	0						0	0.21	8.65	6.07
DMH-03			1	0						0	0.15	1.93	9.43
DMH-06			1	0						0	0	0	9.1
DMH-07			1	0						0	0.15	2.11	10.01
DMH-08			1	0						0	0.1	1.9	10.9
DMH-09			1	0						0	0.08	1.02	12.12
DMH1			1	0						0	0.17	8.81	6.01
DMH-10			1	0						0	0.08	0.82	17.7
DMH-12			1	0						0	0.06	0.73	17.53
DMH-13			1	0						0	0.08	1.15	11.31
DMH-14			1	0						0	0.12	2.68	9.5
DMH-15			1	0						0	0.13	2	8.01
DMH-16			1	0						0	0.03	1.61	8.01
DMH-17			1	0						0	0.19	1.7	7.56
DMH-18			1	0						0	0.13	2.46	8.93
DMH2			1	0						0	0.28	9.62	6.01
DMH-25			1	0						0	0.01	1.61	7.66
DMH-26			1	0						0	0.23	2.12	7.65
DMH-27			1	0						0	0.58	2.57	7.65
DMH-28			1	0						0	1.22	2.04	6.24

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Table 1B: Junctions tag not 2D (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
DMH3			1	0						0	0.15	7.9	6.3
DMH-30			1	0						0	1.45	2	5.9
DMH-31			1	0						0	2.04	2.8	5.88
DMH-32			1	0						0	0.09	1.05	5.53
DMH-32_Weir			1	0						0	0.42	0.64	5.05
J1			1	0						0	0.03	0.39	27.79
J10			1	0						0	0.01	0.2	31.2
J11			1	0						0	0.04	0.66	21.66
J1145			1	0						0	0.01	0.85	5.86
J12			1	0						0	0.05	0.63	17.13
J13			1	0						0	0.05	0.7	21.4
J1334			1	0						0	0	0.05	6.97
J14			1	0						0	0.02	0.24	33.24
J15			1	0						0	0.04	0.47	33.67
J155			1	0						0	0.36	0.52	7.7
J1574			1	0						0	0.01	0.17	8.03
J16			1	0						0	0.02	0.19	35.19
J17			1	0						0	0.02	0.28	35.88
J18			1	0						0	0.02	0.31	14.05
J2			1	0						0	0.03	0.41	21.81
J20			1	0						0	0.04	0.5	16.5
J22			1	0						0	0.02	0.23	14.73
J23			1	0						0	0.05	0.67	8.67
J25			1	0						0	0.03	0.5	31
J26			1	0						0	0.04	0.46	30.56
J27			1	0						0	0.23	1.61	14.61

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Table 1B: Junctions tag not 2D (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
J28			1	0						0	0.06	0.86	14.04
J29			1	0						0	0.07	1.74	15.29
J3			1	0						0	0.03	0.43	28.13
J30			1	0						0	0.08	2.64	7.44
J31			1	0						0	0.05	2.54	7.64
J32			1	0						0	0.07	2.46	7.96
J34			1	0						0	0	0	7.3
J4			1	0						0	0.02	0.31	26.01
J428			1	0						0	2.4	3.3	5.88
J445			1	0						0	0	0.15	16.01
J5			1	0						0	0.02	0.2	23.7
J564			1	0						0	0.01	0.24	13.03
J6			1	0						0	0.05	0.7	22.7
J611			1	0						0	0.01	0.26	13.89
J66			1	0						0	0	0.1	19.65
J7			1	0						0	0.02	0.25	24.25
J71			1	0						0	0.06	1.01	10.21
J8			1	0						0	0.02	0.29	23.09
J9			1	0						0	0	0	32
MH1			1	0						0	0.15	1.21	5.94
MH10			1	0						0	0.01	0.84	9.08
MH11			1	0						0	0.08	3.34	11.34
MH12			1	0						0	0.05	0.85	12.85
MH13			1	0						0	0.03	0.37	24.37
MH14			1	0						0	0.02	0.24	31.24
MH15			1	0						0	0.03	0.39	25.39

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Table 1B: Junctions tag not 2D (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
MH16			1	0						0	0.06	0.7	26.2
MH17			1	0						0	0.02	0.21	28.65
MH18			1	0						0	0.16	3.78	9.08
MH2			1	0						0	0.16	1.6	7.18
MH3			1	0						0	0.17	1.97	8.05
MH4			1	0						0	0.2	4.34	12.17
MH8			1	0						0	0.03	0.88	9.09
MH9			1	0						0	0.13	0.99	9.09
OF-SP-1-WJ			1	0						0	0.11	0.94	5.61
SC1			1	0						0	0.28	9.71	5.94
SC-1			1	0						0	0.1	1.15	5.53
StillingBasin			1	0						0	0.08	1.17	18.96

Table 1C: Junctions tag not 2D

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
_CourtStPond_Outlet	10/31/2018 12:09 PM	4.21	0	4.41	0	0.001	1.263	0	0	-0.02	0	0	0
_Rt6Basin_OF	10/31/2018 12:09 PM	0.59	0	18.83	0	0.816	1.274	0	0	1.41	0	0	0
_SouthSPPondOF	11/01/2018 23:57 PM	2.88	0	7.91	0	0.326	16.971	0	0	27.192	0	0	0
CB1	10/31/2018 12:05 PM	0.61	0	2.72	0	0.076	-0.001	0	0	5.13	0	0	0
CB10	10/31/2018 12:05 PM	0.36	0	0.01	0	0	0.054	0	0	4.44	0	0	0
CB101	10/31/2018 12:07 PM	2.7	0	4.98	0	0.544	0	0	0	2.9	0	0	0
CB104	10/31/2018 12:11 PM	4.77	3.62	7.42	0.126	0.482	-0.185	0	0	-0.331	0	0	0
CB105	10/31/2018 12:20 PM	2.45	10.4	10.4	0.44	0.44	0.01	0	0	-0.396	0	0	0

Table 1C: Junctions tag not 2D (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
CB112	10/31/2018 12:16 PM	4.15	0	3.4	0	0.41	0	0	0	-0.312	0	0	0
CB2	10/31/2018 12:05 PM	0.64	2.73	2.73	0.076	0.076	0	0	0	4.41	0	0	0
CB27	10/31/2018 12:06 PM	1.09	0.31	0.37	0.01	0.012	-0.008	0	0	0.949	0	0	0
CB28	10/31/2018 12:06 PM	3.58	0.26	0.26	0.008	0.008	-0.004	0	0	0.17	0	0	0
CB29	10/31/2018 12:05 PM	3.28	3.41	4.31	0.105	0.133	0.093	0	0	-0.98	0	0	0
CB3	10/31/2018 12:05 PM	0.59	0	0.03	0	0	0.037	0	0	4.51	0	0	0
CB30	10/31/2018 12:05 PM	2.84	0.9	0.9	0.028	0.028	0.279	0	0	-0.04	0	0	0
CB31	10/31/2018 12:05 PM	2.49	0	0.06	0	0	0.03	0	0	0.36	0	0	0
CB32	10/31/2018 12:05 PM	3.29	1.57	1.57	0.044	0.044	0.003	0	0	-0.59	0	0	0
CB33	10/31/2018 12:05 PM	4.34	19.33	19.33	0.563	0.567	0.003	0	0	-0.84	0	0	0
CB35	10/31/2018 12:06 PM	1.36	0	2.43	0	0.077	-0.003	0.1	0.37	3.96	0	0	0
CB36	10/31/2018 12:06 PM	1.35	0.76	2.43	0.022	0.077	-0.005	0.09	0.363	3.727	0	0	0
CB37	10/31/2018 12:06 PM	1.28	0.04	1.68	0.004	0.055	-0.003	0.07	0.285	3.525	0	0	0
CB38	10/31/2018 12:06 PM	0.75	1.7	1.7	0.051	0.051	0	0	0	3.43	0	0	0
CB4	10/31/2018 12:11 PM	9.32	23.03	23.03	0.662	0.799	0.004	0	0	-1.16	0	0	0
CB6	10/31/2018 12:11 PM	8.64	0	6.01	0	0.119	0.084	0	0	-0.67	0	0	0
DMH-03	10/31/2018 12:05 PM	1.92	2.11	19.13	0.058	1.02	0.045	0	0	3.01	0	0	0
DMH-06	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	4.27	0	0	0
DMH-07	10/31/2018 12:05 PM	2.11	6.29	17.06	0.177	0.962	-0.102	0	0	4.79	0	0	0
DMH-08	10/31/2018 12:05 PM	1.89	0	10.87	0	0.785	-0.022	0	0	4.807	0	0	0
DMH-09	10/31/2018 12:05 PM	1.02	0	10.9	0	0.787	0.272	0	0	6.72	0	0	0
DMH1	10/31/2018 12:11 PM	8.81	0	7.38	0	0.003	-2.152	0.92	2.933	0.757	0	0	0
DMH-10	10/31/2018 11:49 AM	0.81	1.99	11.13	0.059	0.787	-0.053	0	0	7.65	0	0	0
DMH-12	10/31/2018 12:14 PM	0.73	7.65	7.65	0.279	0.279	-0.001	0	0	4.843	0	0	0
DMH-13	10/31/2018 12:06 PM	1.15	11.67	17.82	0.327	0.606	0.001	0	0	6.477	0	0	0
DMH-14	10/31/2018 12:06 PM	2.67	1.59	19.21	0.046	0.652	-0.001	0	0	5.891	0	0	0

Table 1C: Junctions tag not 2D (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
DMH-15	10/31/2018 12:06 PM	2	0	19.61	0	0.672	-0.001	0	0	4.737	0	0	0
DMH-16	10/31/2018 12:06 PM	1.61	0	0.02	0	0	0.004	0	0	3.726	0	0	0
DMH-17	10/31/2018 12:06 PM	1.7	0	19.61	0	0.672	0.006	0	0	2.44	0	0	0
DMH-18	10/31/2018 12:06 PM	2.45	0.66	19.63	0.02	0.672	0	0	0	5.845	0	0	0
DMH2	10/31/2018 12:11 PM	9.62	0	18.74	0	0.73	-0.004	0	0	0.29	0	0	0
DMH-25	10/31/2018 12:05 PM	1.6	0	0.23	0	0	0.298	0	0	1.04	0	0	0
DMH-26	10/31/2018 12:05 PM	2.12	0	0.64	0	0.002	12.02	0	0	0.35	0	0	0
DMH-27	10/31/2018 12:05 PM	2.57	8.3	8.3	0.23	0.231	0.432	0	0	-0.25	0	0	0
DMH-28	10/31/2018 12:07 PM	2.04	3.12	8.91	0.091	0.318	0.46	0	0	-0.449	0	0	0
DMH3	10/31/2018 12:05 PM	7.71	0	1.98	0	0.002	0.346	0	0	-0.2	0	0	0
DMH-30	10/31/2018 12:11 PM	2	0.14	6.53	0.004	0.3	0.547	0	0	-0.1	0	0	0
DMH-31	11/01/2018 23:18 PM	2.8	0	7.53	0	0.319	0.702	0	0	0.974	0	0	0
DMH-32	10/31/2018 12:14 PM	1.05	2.5	2.64	0.077	0.082	-0.004	0	0	1.4	0	0	0
DMH-32_Weir	10/31/2018 13:20 PM	0.64	0	1.37	0	0.021	0.286	0	0	1.86	0	0	0
J1	10/31/2018 12:05 PM	0.39	0.84	1.59	0.024	0.045	0.004	0	0	5.11	0	0	0
J10	10/31/2018 12:05 PM	0.2	0.89	0.89	0.024	0.024	0	0	0	5.4	0	0	0
J11	10/31/2018 12:05 PM	0.66	1.82	1.82	0.05	0.05	0	0	0	4.455	0	0	0
J1145	10/31/2018 12:27 PM	0.85	0	10.79	0	0.083	0	0	0	29.152	0	0	0
J12	10/31/2018 12:05 PM	0.63	1.97	1.97	0.057	0.057	0	0	0	4.07	0	0	0
J13	10/31/2018 12:05 PM	0.7	2.33	4.15	0.064	0.114	0	0	0	3.778	0	0	0
J1334	10/31/2018 12:05 PM	0.05	0	1.64	0	0.006	0.003	0	0	29.945	0	0	0
J14	10/31/2018 12:05 PM	0.24	0	0.88	0	0.026	0	0	0	4.96	0	0	0
J15	10/31/2018 12:05 PM	0.47	0.88	0.88	0.026	0.026	0	0	0	4.53	0	0	0
J155	10/31/2018 12:05 PM	0.52	7.48	7.48	0.205	0.207	2.337	0	0	-0.515	0	0	0
J1574	10/31/2018 12:06 PM	0.16	0	10.67	0	0.16	0	0	0	29.835	0	0	0
J16	10/31/2018 12:05 PM	0.19	0	0.46	0	0.013	0.001	0	0	5.41	0	0	0

Table 1C: Junctions tag not 2D (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
J17	10/31/2018 12:05 PM	0.28	0.46	0.46	0.013	0.013	-0.001	0	0	4.737	0	0	0
J18	10/31/2018 12:05 PM	0.31	1.13	1.13	0.032	0.032	0	0	0	3.92	0	0	0
J2	10/31/2018 12:10 PM	0.41	0	2.43	0	0.086	0	0	0	5.99	0	0	0
J20	10/31/2018 12:05 PM	0.5	1.26	3.22	0.037	0.094	-0.001	0	0	4.7	0	0	0
J22	10/31/2018 12:05 PM	0.23	0.86	0.86	0.024	0.024	0.001	0	0	4.27	0	0	0
J23	10/31/2018 12:05 PM	0.66	0	4.07	0	0.118	0	0	0	4.679	0	0	0
J25	10/31/2018 12:05 PM	0.5	1.19	1.19	0.034	0.034	-0.006	0	0	4.3	0	0	0
J26	10/31/2018 12:20 PM	0.46	2.75	3.38	0.112	0.146	0.001	0	0	4.74	0	0	0
J27	10/31/2018 12:05 PM	1.61	2.58	2.58	0.099	0.099	0.028	0.41	0.615	3.385	0	0	0
J28	10/31/2018 12:05 PM	0.86	0.61	6.54	0.024	0.217	0	0	0	4.86	0	0	0
J29	10/31/2018 12:05 PM	1.74	3.41	3.41	0.094	0.094	-0.001	0.23	0.741	6.419	0	0	0
J3	10/31/2018 12:05 PM	0.43	0.75	0.75	0.021	0.021	-0.008	0	0	4.613	0	0	0
J30	10/31/2018 12:05 PM	2.63	4.49	6.3	0.138	0.19	-0.001	0	0	1.86	0	0	0
J31	10/31/2018 12:05 PM	2.53	1.86	1.86	0.052	0.052	0.003	0	0	1.76	0	0	0
J32	10/31/2018 12:06 PM	2.45	0	8.74	0	0.294	-0.005	0.22	1.209	1.841	0	0	0
J34	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	3.95	0	0	0
J4	10/31/2018 12:05 PM	0.31	0.95	0.95	0.026	0.026	0	0	0	4.666	0	0	0
J428	11/01/2018 23:59 PM	3.3	15.16	15.16	0.481	0.499	0	0	0	26.708	0	0	0
J445	10/31/2018 12:20 PM	0.15	0	10.24	0	0.167	0.002	0	0	0.342	0	0	0
J5	10/31/2018 12:15 PM	0.2	0.3	0.3	0.018	0.018	0.028	0	0	4.876	0	0	0
J564	10/31/2018 12:16 PM	0.24	0	20.41	0	0.541	0	0	0	0.258	0	0	0
J6	10/31/2018 12:10 PM	0.7	2.43	2.43	0.086	0.086	0	0	0	4.728	0	0	0
J611	10/31/2018 12:16 PM	0.26	10.15	19.79	0.367	0.533	-0.001	0	0	0.234	0	0	0
J66	10/31/2018 12:20 PM	0.1	0	6.53	0	0.084	0.002	0	0	0.407	0	0	0
J7	10/31/2018 12:05 PM	0.25	1.01	1.96	0.028	0.054	0	0	0	6.262	0	0	0
J71	10/31/2018 12:06 PM	1.01	0	6.54	0	0.217	0.001	0	0	3.967	0	0	0

Table 1C: Junctions tag not 2D (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
J8	10/31/2018 12:10 PM	0.29	2.13	2.4	0.067	0.086	-0.006	0	0	5.289	0	0	0
J9	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	4.8	0	0	0
MH1	10/31/2018 12:05 PM	1.21	0	7.48	0	0.62	0.002	0	0	5.014	0	0	0
MH10	10/31/2018 12:06 PM	0.84	0	0.26	0	0.001	-0.013	0	0	0.96	0	0	0
MH11	10/31/2018 12:05 PM	3.34	0.12	5.96	0.004	0.178	-0.015	0	0	-0.152	0	0	0
MH12	10/31/2018 12:05 PM	0.85	2.01	4.32	0.058	0.13	0.001	0	0	2.307	0	0	0
MH13	10/31/2018 12:05 PM	0.37	1.65	2.32	0.052	0.072	-0.004	0	0	4.37	0	0	0
MH14	10/31/2018 12:05 PM	0.24	0.68	0.68	0.019	0.019	0.008	0	0	3.963	0	0	0
MH15	10/31/2018 12:05 PM	0.39	0.44	2.32	0.013	0.073	-0.006	0	0	5.122	0	0	0
MH16	10/31/2018 12:05 PM	0.7	1.43	1.9	0.045	0.06	-0.001	0	0	4.476	0	0	0
MH17	10/31/2018 12:05 PM	0.21	0.47	0.47	0.015	0.015	-0.003	0	0	3.798	0	0	0
MH18	10/31/2018 12:06 PM	3.78	0	12.66	0	0.724	-0.037	0	0	-0.123	0	0	0
MH2	10/31/2018 12:06 PM	1.59	0	4.91	0	0.544	-0.006	0	0	4.687	0	0	0
MH3	10/31/2018 12:06 PM	1.96	0	4.91	0	0.544	0	0	0	4.019	0	0	0
MH4	10/31/2018 12:10 PM	4.34	4.6	6.59	0.151	0.554	0.009	0	0	-0.161	0	0	0
MH8	10/31/2018 12:06 PM	0.86	0	0.07	0	0.001	0.178	0	0	1.42	0	0	0
MH9	10/31/2018 12:06 PM	0.98	0	0.16	0	0.001	0.922	0	0	1.01	0	0	0
OF-SP-1-WJ	10/31/2018 12:05 PM	0.94	0	7.48	0	0.62	-0.002	0	0	0.56	0	0	0
SC1	10/31/2018 12:11 PM	9.7	0	18.48	0	0.728	0.003	1.05	7.705	0.495	0	0	0
SC-1	10/31/2018 12:14 PM	1.15	0	1.97	0	0.065	0.02	0	0	1.37	0	0	0
StillingBasin	10/31/2018 11:49 AM	0.98	0	8.91	0	0.725	-0.298	0	0	5.34	0	0	0

Table 1D: Junctions tag not 2D

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_CourtStPond_Outlet	0	0	0	0	0	0	1
_Rt6Basin_OF	0	0	0	0	0	0	1
_SouthSPPondOF	0	0	0	0	0	0	1
CB1	0	0	0	0	0	0	1
CB10	0	0	0	0	0	0	1
CB101	0	0	0	0	0	0	1
CB104	0	0	0	0	0	0	1
CB105	0	0	0	0	0	0	1
CB112	0	0	0	0	0	0	1
CB2	0	0	0	0	0	0	1
CB27	0	0	0	0	0	0	1
CB28	0	0	0	0	0	0	1
CB29	0	0	0	0	0	0	1
CB3	0	0	0	0	0	0	1
CB30	0	0	0	0	0	0	1
CB31	0	0	0	0	0	0	1
CB32	0	0	0	0	0	0	1
CB33	0	0	0	0	0	0	1
CB35	0	0	0	0	0	0	1
CB36	0	0	0	0	0	0	1
CB37	0	0	0	0	0	0	1
CB38	0	0	0	0	0	0	1
CB4	0	0	0	0	0	0	1
CB6	0	0	0	0	0	0	1
DMH-03	0	0	0	0	0	0	1
DMH-06	0	0	0	0	0	0	1

Hydro

Table 1D: Junctions tag not 2D (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
DMH-07	0	0	0	0	0	0	1
DMH-08	0	0	0	0	0	0	1
DMH-09	0	0	0	0	0	0	1
DMH1	0	0	0	0	0	0	1
DMH-10	0	0	0	0	0	0	1
DMH-12	0	0	0	0	0	0	1
DMH-13	0	0	0	0	0	0	1
DMH-14	0	0	0	0	0	0	1
DMH-15	0	0	0	0	0	0	1
DMH-16	0	0	0	0	0	0	1
DMH-17	0	0	0	0	0	0	1
DMH-18	0	0	0	0	0	0	1
DMH2	0	0	0	0	0	0	1
DMH-25	0	0	0	0	0	0	1
DMH-26	0	0	0	0	0	0	1
DMH-27	0	0	0	0	0	0	1
DMH-28	0	0	0	0	0	0	1
DMH3	0	0	0	0	0	0	1
DMH-30	0	0	0	0	0	0	1
DMH-31	0	0	0	0	0	0	1
DMH-32	0	0	0	0	0	0	1
DMH-32_Weir	0	0	0	0	0	0	1
J1	0	0	0	0	0	0	1
J10	0	0	0	0	0	0	1
J11	0	0	0	0	0	0	1
J1145	0	0	0	0	0	0	1

Hydra

Table 1D: Junctions tag not 2D (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J12	0	0	0	0	0	0	1
J13	0	0	0	0	0	0	1
J1334	0	0	0	0	0	0	1
J14	0	0	0	0	0	0	1
J15	0	0	0	0	0	0	1
J155	0	0	0	0	0	0	1
J1574	0	0	0	0	0	0	1
J16	0	0	0	0	0	0	1
J17	0	0	0	0	0	0	1
J18	0	0	0	0	0	0	1
J2	0	0	0	0	0	0	1
J20	0	0	0	0	0	0	1
J22	0	0	0	0	0	0	1
J23	0	0	0	0	0	0	1
J25	0	0	0	0	0	0	1
J26	0	0	0	0	0	0	1
J27	0	0	0	0	0	0	1
J28	0	0	0	0	0	0	1
J29	0	0	0	0	0	0	1
J3	0	0	0	0	0	0	1
J30	0	0	0	0	0	0	1
J31	0	0	0	0	0	0	1
J32	0	0	0	0	0	0	1
J34	0	0	0	0	0	0	1
J4	0	0	0	0	0	0	1
J428	0	0	0	0	0	0	1

Legacy

Table 1D: Junctions tag not 2D (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J445	0	0	0	0	0	0	1
J5	0	0	0	0	0	0	1
J564	0	0	0	0	0	0	1
J6	0	0	0	0	0	0	1
J611	0	0	0	0	0	0	1
J66	0	0	0	0	0	0	1
J7	0	0	0	0	0	0	1
J71	0	0	0	0	0	0	1
J8	0	0	0	0	0	0	1
J9	0	0	0	0	0	0	1
MH1	0	0	0	0	0	0	1
MH10	0	0	0	0	0	0	1
MH11	0	0	0	0	0	0	1
MH12	0	0	0	0	0	0	1
MH13	0	0	0	0	0	0	1
MH14	0	0	0	0	0	0	1
MH15	0	0	0	0	0	0	1
MH16	0	0	0	0	0	0	1
MH17	0	0	0	0	0	0	1
MH18	0	0	0	0	0	0	1
MH2	0	0	0	0	0	0	1
MH3	0	0	0	0	0	0	1
MH4	0	0	0	0	0	0	1
MH8	0	0	0	0	0	0	1
MH9	0	0	0	0	0	0	1
OF-SP-1-WJ	0	0	0	0	0	0	1

Hydra

Table 1D: Junctions tag not 2D (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
SC1	0	0	0	0	0	0	1
SC-1	0	0	0	0	0	0	1
StillingBasin	0	0	0	0	0	0	1

Table 2A: Conduits tag not 2D or 2Dout

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
_C101	_CourtStPond_Outlet	DMH1	prop	36.453	0.011	0	3.88	0	0	0.5	0	0
C33	CB1	MH1		12.784	0.011	0	0	0	0	0.5	0	0
C11	CB10	CB3		28.475	0.014	0	0	0	0	0.5	0	0
C5	CB101	MH3		43.66	0.014	0	0	0	0	0.5	0	0
C2	CB104	CB112		471.27	0.014	0	0.89	0	0	0.5	0	0
C1	CB105	CB104		263.405	0.014	0	0.15	0	0	0.5	0	0
C3	CB112	MH4		247.982	0.014	0	0	0	0	0.5	0	0
C13	CB2	CB1		25.561	0.014	0	0	0	0	0.5	0	0
C39	CB27	MH18		54.24	0.014	0	0	0	0	0.5	0	0
C44	CB28	MH18		27.307	0.014	0	0	0	0	0.5	0	0
C38	CB29	DW#9		20.886	0.014	0	0	0	0	0.5	0	0
C12	CB3	CB2		48.17	0.014	0	0	0	0	0.5	0	0
C37	CB30	DW#9		15.234	0.014	0	0	0	0	0.5	0	0
C47	CB31	MH11		13.987	0.014	0	0	0	0	0.5	0	0
C48	CB32	MH11		53.849	0.014	0	0	0	0	0.5	0	0
C43	CB33	MH18		40.72	0.014	0	0	0	0	0.5	0	0
C56	CB35	J32		19.765	0.014	0	0	0	0	0.5	0	0

Table 2A: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C31	CB36	CB35		31.906	0.014	0	0	0	0	0.5	0	0
C54	CB37	CB36		48.25	0.014	0	0	0	0	0.5	0	0
C55	CB38	CB37		20.613	0.014	0	0	0	0	0.5	0	0
_C102	CB4	DMH2	prop	77.715	0.011	0	0	0	0	0.5	0	0
C107	CB6	CB4	prop	95.958	0.011	0	0	0	0	0.5	0	0
C28	DMH-03	_Rt6Basin&Forebay	prop	95.514	0.011	0	4.1	0	0	0.5	0	0
C25	DMH-06	J34	prop	51.398	0.011	0	1.3	0	0	0.5	0	0
C23	DMH-07	DMH-03	prop	97.892	0.011	0	0	0	0	0.5	0	0
C22	DMH-08	DMH-07	prop	77.395	0.011	0	0	0	0	0.5	0	0
C115	DMH-09	DMH-08	prop	70.423	0.011	0	0	0	0	0.5	0	0
C105	DMH1	DMH2		29.411	0.01	0	0	0	0	0	0	0
C21	DMH-10	DMH-09	prop	203.077	0.011	0	0	0	0	0.5	0	0
C109	DMH-12	DMH-13	prop	265.697	0.011	0	0	0	0	0.5	0	0
C103_1	DMH-13	DMH-14	prop	166.97	0.011	0	0	0	0	0.5	0	0
C1418	DMH-14	DMH-18	prop	58.106	0.011	0	0	0	0	0.5	0	0
C97	DMH-15	DMH-17	prop	28.577	0.011	0	0	0	0	0.5	0	0
C16	DMH-16	DMH-15		48.81	0.011	0	0	0	0	0.5	0	0
_C107	DMH-17	_CourtStWetlandArea	Zone4	20	0.011	0	2.7	0	0	0.5	0	0
C15	DMH-18	DMH-15		114.64	0.011	0	0	0	0	0.5	0	0
C103	DMH2	SC1	prop	14.373	0.011	0	0	0	0	0.5	0	0
C90	DMH-25	DMH-26	prop	70.342	0.011	0	0	0	0	0.5	0	0
C17	DMH-26	DMH-27	prop	107.718	0.011	0	0	0	0	0.5	0	0
C155	DMH-27	DMH-28	prop	217.352	0.011	0	0	0	0	0.5	0	0
C92	DMH-28	DMH-30	prop	39.182	0.011	0	0	0	0	0.5	0	0
_C105	DMH3	CB6	prop	145.588	0.011	0	0	0	0	0.5	0	0
C14	DMH-30	DMH-31		217.068	0.011	0	0	0	0	0.5	0	0

HEADQ

Table 2A: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C30	DMH-31	_SouthSPPondOF	Zone5	43.924	0.011	0	0	0	0	0.5	0	0
C20	DMH-32	SC-1		23.899	0.011	0	0	0	0	0.5	0	0
C19_2	DMH-32_Weir	DMH-31		32.607	0.011	0	0.67	0	0	0	0	0
C67	J1	OF-RS-6-N	Zone1	64.921	0.014	0	0	0	0	0.5	0	0
C71	J10	OF-RS-10-S	Zone1	69.271	0.014	0	0	0	0	0.5	0	0
C22328	J1084	J210	2D_Court	20.667	0.011	0	0	0	0	0	0	0
C59	J11	J13		35.428	0.014	0	0	0	0	0.5	0	0
C22244	J1105	_CourtStWetlandArea	2D_Court	25.776	0.011	0	1	0	0	0	0	0
C22267	J1105	J210	2D_Court	21.342	0.011	0	0	0	0	0	0	0
C22143	J1140	J218	2D_Court	23.818	0.011	0	0	0	0	0	0	0
C9	J12	J20		67.86	0.014	0	0	0	0	0.5	0	0
C60	J13	OF-RS-3-N		122.618	0.014	0	0	0	0	0.5	0	0
C21144	J1361	J361	2D_Winthrop	16.278	0.011	0	0	0	0	0	0	0
C21018	J1382	J369	2D_Winthrop	22.144	0.011	0	0	0	0	0	0	0
C21134	J1382	J361	2D_Winthrop	21.554	0.011	0	0	0	0	0	0	0
C21048	J1383	J370	2D_Winthrop	26.203	0.011	0	0	0	0	0	0	0
C21088	J1383	J361	2D_Winthrop	26.17	0.011	0	0	0	0	0	0	0
C75	J14	OF-RS-8-N	Zone1	60.067	0.014	0	0	0	0	0.5	0	0
C21017	J1405	J369	2D_Winthrop	19.627	0.011	0	0	0	0	0	0	0
C2988	J1425	J369	2D_Winthrop	25.153	0.011	0	0	0	0	0	0	0
C74	J15	J14		75.097	0.014	0	0	0	0	0.5	0	0
C2592	J1521	J400	2D_SouthShankPainter	18.564	0.011	0	0	0	0	0	0	0
C2549	J1538	_SouthSPPondOF	2D_SouthShankPainter	26.943	0.011	0	0.072	0	0	0	0	0
C2547	J1550	_SouthSPPondOF	2D_SouthShankPainter	26.212	0.011	0	0.072	0	0	0	0	0
C2489	J1562	J420	2D_SouthShankPainter	22.535	0.011	0	0	0	0	0	0	0
C73	J16	OF-RS-9-N	Zone1	53.115	0.014	0	0	0	0	0.5	0	0

Table 2A: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C72	J17	J16		75.234	0.014	0	0	0	0	0.5	0	0
C57	J18	OF-RS-1-N		45.993	0.014	0	0	0	0	0.5	0	0
C69	J2	OF-RS-11-N	Zone1	52.784	0.014	0	0	0	0	0.5	0	0
C10	J20	J23		207.904	0.014	0	0	0	0	0.5	0	0
C22348	J200	J210	2D_Court	24.248	0.15	0	0	0	0	0	0	0
C58	J22	J23		125.62	0.014	0	0	0	0	0.5	0	0
C27	J23	OF-RS-2-N		16.68	0.014	0	0	0	0	0.5	0	0
C76	J25	J26		70.204	0.014	0	0	0	0	0.5	0	0
C77	J26	OF-RS-7-S	Zone1	74.453	0.014	0	0	0	0	0.5	0	0
C80	J27	J28		84.437	0.014	0	0	0	0	0.5	0	0
C81_1	J28	J71	prop	208.587	0.014	0	0	0	0	0.5	0	0
C82	J29	J28		113.251	0.014	0	0	0	0	0.5	0	0
C66	J3	J1		75.518	0.014	0	0	0	0	0.5	0	0
C79	J30	OF-RS-13-S	Zone1	50.828	0.014	0	0	0	0	0.5	0	0
C78	J31	J30		52.913	0.014	0	0	0	0	0.5	0	0
C83	J32	OF-RS-12-N	Zone1	21.49	0.014	0	0	0	0	0.5	0	0
C24	J34	_Rt6Basin&Forebay	prop	98.475	0.011	0	4.1	0	0	0.5	0	0
C64	J4	J7		70.823	0.014	0	0	0	0	0.5	0	0
C2414	J421	J432	2D_SouthShankPainter	27.713	0.15	0	0	0	0	0	0	0
C2454	J421	J420	2D_SouthShankPainter	27.174	0.15	0	0	0	0	0	0	0
C2406	J433	J432	2D_SouthShankPainter	29.38	0.15	0	0	0	0	0	0	0
C6814	J445	J611	road	301.421	0.011	0	0	0	0	0	0	0
C61	J5	J8		70.68	0.014	0	0	0	0	0.5	0	0
C6816	J564	J672	road	29.034	0.011	0	0	0	0	0	0	0
C68	J6	J2		76.875	0.014	0	0	0	0	0.5	0	0
C6815	J611	J564	road	169.519	0.011	0	0	0	0	0	0	0

Table 2A: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C111	J66	J445	road	263.865	0.011	0	0	0	0	0	0	0
C65	J7	OF-RS-5-S		67.331	0.014	0	0	0	0	0.5	0	0
C81_2	J71	J32	prop	193.283	0.014	0	0	0	0	0.5	0	0
C62	J8	OF-RS-4-S		67.751	0.014	0	0	0	0	0.5	0	0
C70	J9	J10		77.687	0.014	0	0	0	0	0.5	0	0
C8	MH1	OF-SP-1-WJ	prop	20.094	0.014	0	0	0	0	0.5	0	0
C42	MH10	MH18		39.24	0.014	0	0	0	0	0.5	0	0
C45	MH11	MH18		122.435	0.014	0	0	0	0	0.5	0	0
C46	MH12	MH11		84.66	0.014	0	0	0	0	0.5	0	0
C50	MH13	MH12		219.97	0.014	0	0	0	0	0.5	0	0
C49	MH14	MH13		212.01	0.014	0	0	0	0	0.5	0	0
C52	MH15	MH18		432.199	0.014	0	0	0	0	0.5	0	0
C51	MH16	MH15		116.201	0.014	0	0	0	0	0.5	0	0
C53	MH17	MH16		134.35	0.014	0	0	0	0	0.5	0	0
C18	MH18	WinthropPond	Zone6	482.605	0.011	0	0	0	0	0.5	0	0
C7	MH2	MH1	prop	190.137	0.014	0	0	0	0	0.5	0	0
C6	MH3	MH2	prop	114.494	0.014	0	0	0	0	0.5	0	0
C4	MH4	CB101		119.267	0.014	0	0	0	0	0.5	0	0
C40	MH8	MH9		25.283	0.014	0	0	0	0	0.5	0	0
C41	MH9	MH10		23.109	0.014	0	0	0	0	0.5	0	0
C7147	OF-SP-1-WJ	DuckPond	Zone2	20	0.014	0	0	0	0	0.5	0	0.5
C26	Rt6Drywells	_Rt6Basin&Forebay	prop	177.669	0.011	3.43	4.1	0	0	0.5	0	0
C141	SC1	_PSWetWell	prop	16.979	0.011	0	9	0	0	0.5	0	0
C2314	SC-1	SU1		8.155	0.011	0	0.5	0	0	0.5	0	0
C19	StillingBasin	DMH-10		99.75	0.011	0	0	0	0	0	0	0

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Table 2B: Conduits tag not 2D or 2Dout

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
_C101	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01976	4.41
C33	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06664	2.72
C11	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00808	0.01
C5	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01145	4.91
C2	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00352	3.01
C1	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02256	3.87
C3	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00464	3.28
C13	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01956	2.72
C39	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04984	0.36
C44	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00732	0.25
C38	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.18151	0.91
C12	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00104	0.03
C37	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.28829	0.9
C47	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06088	0.06
C48	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0039	1.57
C43	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00614	7.12
C56	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06388	2.43
C31	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00752	2.43
C54	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00477	1.68
C55	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03009	1.68
_C102	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00579	18.74
C107	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00604	6.01
C28	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00419	19.13
C25	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00973	0
C23	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00409	17.05
C22	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01421	10.91

Hydro

Table 2B: Conduits tag not 2D or 2Dout (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C115	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.02983	10.87
C105	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.02755	7.38
C21	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.02847	10.9
C109	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.025	7.65
C103_1	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.02001	17.65
C1418	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00602	19
C97	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00525	19.61
C16	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00799	0.02
_C107	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.008	19.61
C15	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00401	19.61
C103	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01113	18.48
C90	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00739	0.23
C17	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00418	0.64
C155	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00405	6
C92	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00766	6.05
_C105	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00673	1.98
C14	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00378	6.49
C30	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00182	7.48
C20	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00418	1.84
C19_2	0	YES	CIRCULAR	1	0	0	0	1				NO		NO	0.02043	1.37
C67	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02666	1.58
C71	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.10685	0.88
C22328	0	NO	RECT_OPEN	30	17.222	2	0	1				NO		NO	0.35436	0
C59	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00847	1.82
C22244	0	NO	RECT_OPEN	30	19.828	2	0	1				NO		NO	0.3487	0
C22267	0	NO	RECT_OPEN	30	17.785	2	0	1				NO		NO	0.31905	0

REVIEWED

Table 2B: Conduits tag not 2D or 2Dout (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C22143	0	NO	RECT_OPEN	30	19.848	2	0	1				NO		NO	0.0917	0
C9	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00737	1.97
C60	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01085	4.14
C21144	0	NO	RECT_OPEN	30	12.521	2	0	1				NO		NO	0.0484	9.89
C21018	0	NO	RECT_OPEN	30	17.034	2	0	1				NO		NO	0.04684	0
C21134	0	NO	RECT_OPEN	30	17.962	2	0	1				NO		NO	0.04812	0
C21048	0	NO	RECT_OPEN	30	18.716	2	0	1				NO		NO	0.04087	0
C21088	0	NO	RECT_OPEN	30	18.693	2	0	1				NO		NO	0.04092	0
C75	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04867	0.88
C21017	0	NO	RECT_OPEN	30	16.356	2	0	1				NO		NO	0.04938	0.7
C2988	0	NO	RECT_OPEN	30	19.348	2	0	1				NO		NO	0.05722	1.25
C74	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00266	0.88
C2592	0	NO	RECT_OPEN	30	15.47	2	0	1				NO		NO	0.05216	0
C2549	0	NO	RECT_OPEN	30	19.245	2	0	1				NO		NO	0.14871	0.05
C2547	0	NO	RECT_OPEN	30	20.163	2	0	1				NO		NO	0.15568	0.39
C2489	0	NO	RECT_OPEN	30	17.335	2	0	1				NO		NO	0.19457	7.24
C73	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03523	0.46
C72	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00798	0.46
C57	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03416	1.13
C69	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05236	2.43
C10	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03851	3.21
C22348	0	NO	RECT_OPEN	30	20.207	2	0	1				NO		NO	0.32717	0
C58	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05181	0.86
C27	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04441	4.05
C76	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0057	1.18
C77	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06663	3.38

REVIEWED

Table 2B: Conduits tag not 2D or 2Dout (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C80	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	-0.00213	2.58
C81_1	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.01911	6.54
C82	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00327	3.41
C66	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00397	0.75
C79	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01338	6.27
C78	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00567	1.82
C83	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04658	8.74
C24	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00203	0
C64	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02401	0.95
C2414	0	NO	RECT_OPEN	30	23.094	2	0	1				NO		NO	0.10717	0.73
C2454	0	NO	RECT_OPEN	30	20.903	2	0	1				NO		NO	0.17295	1.07
C2406	0	NO	RECT_OPEN	30	20.986	2	0	1				NO		NO	0.11675	0.21
C6814	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00739	10.21
C61	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0099	0.3
C6816	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00696	20.41
C68	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00781	2.43
C6815	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00493	19.78
C111	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.01404	6.5
C65	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.20909	1.96
C81_2	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.01912	6.38
C62	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.17455	2.4
C70	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01287	0
C8	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00299	7.48
C42	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.07513	0.26
C45	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02206	4.62
C46	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0473	4.28

REVIEWED

Table 2B: Conduits tag not 2D or 2Dout (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C50	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05463	2.31
C49	0	NO	CIRCULAR	0.833	0	0	0	1				NO		NO	0.03304	0.67
C52	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04563	2.31
C51	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0043	1.89
C53	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02189	0.47
C18	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00787	11.68
C7	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00447	4.93
C6	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00437	4.91
C4	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01048	4.98
C40	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00435	0.05
C41	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	-0.00606	0.15
C7147	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.03352	7.48
C26	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00225	0.72
C141	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01355	18.41
C2314	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00491	1.96
C19	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00912	10.33

Hero

Table 2C: Conduits tag not 2D or 2Dout

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
_C101	10/31/2018 12:04 PM	2.45	0.12	1	0			1	0	0	0	0
C33	10/31/2018 12:05 PM	4	0.25	0.81	0			1	0	0	0	0
C11	10/31/2018 12:05 PM	0.05	0	0.48	0			1	0	0	0	0
C5	10/31/2018 12:15 PM	6.25	1.39	1	0			1	0	0	0	0
C2	10/31/2018 13:18 PM	3.83	1.53	1	0			1	0	0	0	0
C1	10/31/2018 12:25 PM	4.93	0.78	1	0			1	0	0	0	0
C3	10/31/2018 12:54 PM	4.17	1.46	1	0			1	0	0	0	0
C13	10/31/2018 12:05 PM	5.58	0.59	0.63	0			1	0	0	0	0
C39	10/31/2018 12:04 PM	0.64	0.05	1	0			1	0	0	0	0
C44	10/31/2018 12:05 PM	0.32	0.09	1	0			1	0	0	0	0
C38	10/31/2018 12:05 PM	1.15	0.06	1	0			1	0	0	0	0
C12	10/31/2018 11:55 AM	0.1	0.03	0.62	0			1	0	0	0	0
C37	10/31/2018 12:05 PM	1.15	0.05	1	0			1	0	0	0	0
C47	10/31/2018 11:57 AM	0.11	0.01	1	0			1	0	0	0	0
C48	10/31/2018 12:05 PM	2	0.76	1	0			1	0	0	0	0
C43	10/31/2018 11:48 AM	9.07	2.75	1	0			1	0	0	0	0
C56	10/31/2018 12:05 PM	3.73	0.29	1	0			1	0	0	0	0
C31	10/31/2018 12:05 PM	5.47	0.85	1	0			1	0	0	0	0
C54	10/31/2018 12:05 PM	2.77	0.73	1	0			1	0	0	0	0
C55	10/31/2018 12:05 PM	3.51	0.29	0.88	0			1	0	0	0	0
_C102	10/31/2018 12:01 PM	6.29	0.92	1	0			1	0	0	0	0
C107	10/31/2018 12:04 PM	3.4	0.62	1	0			1	0	0	0	0
C28	10/31/2018 12:05 PM	6.57	1.11	0.87	0			1	0	0	0	0
C25	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C23	10/31/2018 12:05 PM	6.13	1	0.98	0			1	0	0	0	0
C22	10/31/2018 12:06 PM	6.66	0.74	1	0			1	0	0	0	0

Table 2C: Conduits tag not 2D or 2Dout (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C115	10/31/2018 12:05 PM	8.11	0.51	0.84	0			1	0	0	0	0
C105	10/31/2018 12:04 PM	2.35	0.15	1	0			1	0	0	0	0
C21	10/31/2018 12:05 PM	10.86	0.52	0.6	0			1	0	0	0	0
C109	10/31/2018 12:14 PM	8.99	0.63	0.72	0			1	0	0	0	0
C103_1	10/31/2018 12:05 PM	6.67	0.47	0.79	0			1	0	0	0	0
C1418	10/31/2018 12:06 PM	6.05	0.92	1	0			1	0	0	0	0
C97	10/31/2018 12:06 PM	6.46	1.01	0.92	0			1	0	0	0	0
C16	10/31/2018 11:56 AM	0.03	0	1	0			1	0	0	0	0
_C107	10/31/2018 12:06 PM	7.56	0.82	0.77	0			1	0	0	0	0
C15	10/31/2018 12:06 PM	6.24	1.16	1	0			1	0	0	0	0
C103	10/31/2018 12:01 PM	6.98	0.65	1	0			1	0	0	0	0
C90	10/31/2018 11:57 AM	0.44	0.06	1	0			1	0	0	0	0
C17	10/31/2018 11:56 AM	0.57	0.13	1	0			1	0	0	0	0
C155	10/31/2018 12:00 PM	4.89	1.24	1	0			1	0	0	0	0
C92	10/31/2018 12:01 PM	4.93	0.91	1	0			1	0	0	0	0
_C105	10/31/2018 12:05 PM	2.52	0.57	1	0			1	0	0	0	0
C14	10/31/2018 12:04 PM	5.36	1.38	1	0			1	0	0	0	0
C30	10/31/2018 12:06 PM	6.95	1.41	1	0			1	0	0	0	0
C20	10/31/2018 12:00 PM	3.05	0.67	1	0			1	0	0	0	0
C19_2	10/31/2018 12:14 PM	3.59	0.23	0.82	0			1	0	0	0	0
C67	10/31/2018 12:05 PM	5.79	0.29	0.38	0			1	0	0	0	0
C71	10/31/2018 12:05 PM	8.17	0.08	0.2	0			1	0	0	0	0
C22328	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C59	10/31/2018 12:05 PM	3.21	0.6	0.68	0			1	0	0	0	0
C22244	10/31/2018 00:00 AM	0	0	0.03	0			1	0	0	0	0
C22267	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0

HEC-RAS

Table 2C: Conduits tag not 2D or 2Dout (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C22143	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C9	10/31/2018 12:05 PM	4.31	0.69	0.56	0			1	0	0	0	0
C60	10/31/2018 12:05 PM	5.29	0.41	0.46	0			1	0	0	0	0
C21144	10/31/2018 12:19 PM	3.5	0	0.01	0			1	0	0	0	0
C21018	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C21134	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C21048	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C21088	10/31/2018 00:00 AM	0	0	0.01	0			1	0	0	0	0
C75	10/31/2018 12:05 PM	6.15	0.12	0.24	0			1	0	0	0	0
C21017	10/31/2018 12:09 PM	0.17	0	0.01	0			1	0	0	0	0
C2988	10/31/2018 12:09 PM	0.26	0	0.01	0			1	0	0	0	0
C74	10/31/2018 12:05 PM	3.52	0.52	0.36	0			1	0	0	0	0
C2592	10/31/2018 12:17 PM	0	0	0	0			1	0	0	0	0
C2549	10/31/2018 12:08 PM	0.01	0	0.05	0			1	0	0	0	0
C2547	10/31/2018 12:07 PM	0.05	0	0.05	0			1	0	0	0	0
C2489	10/31/2018 12:07 PM	0.93	0	0.05	0			1	0	0	0	0
C73	10/31/2018 12:05 PM	4.55	0.07	0.19	0			1	0	0	0	0
C72	10/31/2018 12:05 PM	3.29	0.16	0.23	0			1	0	0	0	0
C57	10/31/2018 12:05 PM	5.74	0.18	0.3	0			1	0	0	0	0
C69	10/31/2018 12:10 PM	8.23	0.32	0.4	0			1	0	0	0	0
C10	10/31/2018 12:05 PM	6.77	0.49	0.58	0			1	0	0	0	0
C22348	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C58	10/31/2018 12:05 PM	2.53	0.11	0.45	0			1	0	0	0	0
C27	10/31/2018 12:05 PM	8.11	0.58	0.61	0			1	0	0	0	0
C76	10/31/2018 12:05 PM	3.44	0.47	0.45	0			1	0	0	0	0
C77	10/31/2018 12:20 PM	9.89	0.4	0.45	0			1	0	0	0	0

Hello

Table 2C: Conduits tag not 2D or 2Dout (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C80	10/31/2018 12:05 PM	3.39	1.69	0.93	0			1	0	0	0	0
C81_1	10/31/2018 12:05 PM	7.12	0.79	0.74	0			1	0	0	0	0
C82	10/31/2018 12:05 PM	4.48	1.8	0.93	0			1	0	0	0	0
C66	10/31/2018 12:05 PM	2.48	0.36	0.41	0			1	0	0	0	0
C79	10/31/2018 12:05 PM	7.99	1.64	1	0			1	0	0	0	0
C78	10/31/2018 12:05 PM	2.32	0.73	1	0			1	0	0	0	0
C83	10/31/2018 12:06 PM	11.12	1.22	1	0			1	0	0	0	0
C24	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C64	10/31/2018 12:05 PM	5.29	0.18	0.28	0			1	0	0	0	0
C2414	10/31/2018 12:07 PM	0.51	0	0.02	0			1	0	0	0	0
C2454	10/31/2018 12:06 PM	0.11	0	0.05	0			1	0	0	0	0
C2406	10/31/2018 12:06 PM	0.25	0	0.02	0			1	0	0	0	0
C6814	10/31/2018 12:20 PM	2.49	0.14	0.41	0			1	0	0	0	0
C61	10/31/2018 12:15 PM	2.28	0.09	0.24	0			1	0	0	0	0
C6816	10/31/2018 12:16 PM	5.04	0.3	0.41	0			1	0	0	0	0
C68	10/31/2018 12:10 PM	5.37	0.83	0.56	0			1	0	0	0	0
C6815	10/31/2018 12:16 PM	3.95	0.34	0.5	0			1	0	0	0	0
C111	10/31/2018 12:20 PM	2.59	0.07	0.25	0			1	0	0	0	0
C65	10/31/2018 12:05 PM	12.95	0.13	0.25	0			1	0	0	0	0
C81_2	10/31/2018 12:06 PM	5.55	0.77	0.9	0			1	0	0	0	0
C62	10/31/2018 12:10 PM	12.84	0.17	0.29	0			1	0	0	0	0
C70	10/31/2018 00:00 AM	0	0	0.1	0			1	0	0	0	0
C8	10/31/2018 12:05 PM	5.53	1.4	0.72	0			1	0	0	0	0
C42	10/31/2018 12:00 PM	0.49	0.03	0.92	0			1	0	0	0	0
C45	10/31/2018 12:01 PM	5.88	0.94	1	0			1	0	0	0	0
C46	10/31/2018 12:05 PM	5.85	0.59	0.93	0			1	0	0	0	0

HEC-RAS

Table 2C: Conduits tag not 2D or 2Dout (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C50	10/31/2018 12:05 PM	5.96	0.3	0.61	0			1	0	0	0	0
C49	10/31/2018 12:05 PM	3.69	0.18	0.37	0			1	0	0	0	0
C52	10/31/2018 12:05 PM	3.96	0.33	0.7	0			1	0	0	0	0
C51	10/31/2018 12:05 PM	4.31	0.87	0.55	0			1	0	0	0	0
C53	10/31/2018 12:05 PM	1.36	0.1	0.45	0			1	0	0	0	0
C18	10/31/2018 12:05 PM	6.61	1.06	1	0			1	0	0	0	0
C7	10/31/2018 12:14 PM	4.17	1.23	0.98	0			1	0	0	0	0
C6	10/31/2018 12:15 PM	4	1.24	1	0			1	0	0	0	0
C4	10/31/2018 12:03 PM	6.34	1.47	1	0			1	0	0	0	0
C40	10/31/2018 12:00 PM	0.37	0.02	0.93	0			1	0	0	0	0
C41	10/31/2018 12:00 PM	0.81	0.06	0.91	0			1	0	0	0	0
C7147	10/31/2018 12:05 PM	14.35	0.42	0.34	0			1	0	0	0	0
C26	10/31/2018 12:08 PM	2.53	0.36	0.39	0			1	0	0	0	0
C141	10/31/2018 12:01 PM	8.69	0.59	1	0			1	0	0	0	0
C2314	10/31/2018 12:00 PM	3.55	0.66	1	0			1	0	0	0	0
C19	10/31/2018 11:49 AM	9.39	0.87	0.61	0			1	0	0	0	0

Filed

Table 2D: Conduits tag not 2D or 2Dout

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
_C101	AUTOMATIC	0.9	0.9	0.92	0.01	0.01	1	0.25	0.02	0	0	0
C33	AUTOMATIC	0.01	0.01	0.52	0.01	0.01	1	0.06	0.35	0.03	0.85	0
C11	AUTOMATIC	0	0	0	0	0	1	0.66	0.02	0	0.74	0
C5	AUTOMATIC	1.57	1.8	1.57	1.64	1.57	1	0.06	0.73	0.22	0.64	0
C2	AUTOMATIC	1.77	2.38	1.77	2.51	1.77	1	0.05	0.04	0	0	0
C1	AUTOMATIC	1.03	1.03	2.26	0.01	0.01	1	0.14	0.07	0.19	0.23	0
C3	AUTOMATIC	1.85	1.99	1.87	1.7	1.33	1	0.05	0.92	0	0.58	0
C13	AUTOMATIC	0	0	0	0	0	1	0.13	0.5	0.38	0	0
C39	AUTOMATIC	0.08	0.08	0.8	0.01	0.01	1	0.02	0.95	0	0.97	0
C44	AUTOMATIC	0.74	0.74	0.8	0.01	0.01	1	0.02	0.49	0	0.76	0
C38	AUTOMATIC	43.26	43.26	45.24	0.01	0.01	1	0.02	0.97	0	0.06	0
C12	AUTOMATIC	0	0	0	0	0	1	0.13	0.34	0	0.5	0
C37	AUTOMATIC	43.07	43.07	45.24	0.01	0.01	1	0.02	0.97	0.01	0.07	0
C47	AUTOMATIC	0.31	0.31	0.4	0.01	0.01	1	0.51	0.01	0	0.74	0
C48	AUTOMATIC	0.38	0.38	0.4	0.01	0.01	1	0.51	0.4	0	0.87	0
C43	AUTOMATIC	0.8	1.02	0.8	1.24	0.8	1	0.02	0.62	0.32	0.09	0
C56	AUTOMATIC	0.1	0.1	0.28	0.01	0.01	1	0.19	0.04	0.25	0.77	0
C31	AUTOMATIC	0.09	0.09	0.1	0.01	0.01	1	0.22	0.5	0.28	0.01	0
C54	AUTOMATIC	0.07	0.07	0.09	0.01	0.01	1	0.22	0.28	0	0.64	0
C55	AUTOMATIC	0.01	0.01	0.07	0.01	0.01	1	0.72	0.01	0.26	0.74	0
_C102	AUTOMATIC	1.04	1.04	1.05	0.01	0.04	1	0.12	0.54	0.33	0	0
C107	AUTOMATIC	1.04	1.04	1.12	0.01	0.01	1	0.12	0.72	0.04	0.32	0
C28	AUTOMATIC	0.01	0.01	0.01	0.17	0.01	1	0.05	0	0	0	0
C25	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C23	AUTOMATIC	0.01	0.08	0.01	0.01	0.01	1	0.05	0.44	0.02	0.81	0
C22	AUTOMATIC	0.21	0.21	0.52	0.01	0.01	1	0.54	0.25	0.21	0.85	0

Table 2D: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C115	AUTOMATIC	0.01	0.01	0.21	0.01	0.01	1	0.54	0	0.45	0.85	0
C105	AUTOMATIC	1.02	1.02	1.05	0.01	0.01	1	0.16	0.03	0	0.73	0
C21	AUTOMATIC	0	0	0	0	0	1	0.54	0	0.45	0.63	0
C109	AUTOMATIC	0	0	0	0	0	1	0.1	0.48	0.41	0.86	0
C103_1	AUTOMATIC	0.01	0.01	0.2	0.01	0.01	1	0.06	0.52	0.38	0.94	0
C1418	AUTOMATIC	0.17	0.2	0.17	0.01	0.17	1	0.05	0.61	0.33	0.59	0
C97	AUTOMATIC	0.01	0.01	0.01	0.05	0.01	1	0.05	0.13	0.35	0.53	0
C16	AUTOMATIC	0.41	0.41	0.72	0.01	0.01	1	0.52	0.09	0	0.69	0
_C107	AUTOMATIC	0	0	0	0	0	1	0.05	0.64	0.04	0	0
C15	AUTOMATIC	0.01	0.17	0.01	0.2	0.01	1	0.52	0.17	0.3	0.49	0
C103	AUTOMATIC	1.05	1.05	1.05	0.01	0.04	1	0.05	0.49	0.35	0.59	0
C90	AUTOMATIC	0.31	0.31	0.44	0.01	0.01	1	0.3	0.02	0	0.74	0
C17	AUTOMATIC	0.37	0.37	0.51	0.01	0.01	1	0.12	0.7	0	0.08	0
C155	AUTOMATIC	0.51	0.51	32.96	0.3	0.33	1	0.05	0.88	0	0.21	0
C92	AUTOMATIC	32.96	32.96	35.11	0.01	0.33	1	0.05	0.84	0.1	0.1	0
_C105	AUTOMATIC	1.02	1.02	1.11	0.01	0.01	1	0.24	0.04	0	0.73	0
C14	AUTOMATIC	34.9	35.11	35.87	0.59	0.38	1	0.05	0.95	0	0.14	0
C30	AUTOMATIC	35.66	35.74	35.66	0.58	0.27	1	0.05	0.91	0.04	0.1	0
C20	AUTOMATIC	0.23	0.23	0.4	0.01	0.01	1	0.03	0.97	0	0.51	0
C19_2	AUTOMATIC	0.01	0.01	35.63	0.01	0.01	1	0.24	0.75	0	0.01	0
C67	AUTOMATIC	0	0	0	0	0	1	0.16	0.49	0.34	0	0
C71	AUTOMATIC	0	0	0	0	0	1	0.19	0.49	0.31	0	0
C22328	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C59	AUTOMATIC	0	0	0	0	0	1	0.16	0.35	0	0.79	0
C22244	AUTOMATIC	0	0	0	0	0	1	0.2	0	0	0	0
C22267	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0

Table 2D: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C22143	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C9	AUTOMATIC	0	0	0	0	0	1	0.03	0.65	0.32	0.5	0
C60	AUTOMATIC	0	0	0	0	0	1	0.16	0.5	0.35	0	0
C21144	AUTOMATIC	0	0	0	0	0	1	0.25	0.75	0	0.75	0
C21018	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21134	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21048	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C21088	AUTOMATIC	0	0	0	0	0	1	0.25	0	0	0	0
C75	AUTOMATIC	0	0	0	0	0	1	0.07	0.49	0.44	0	0
C21017	AUTOMATIC	0	0	0	0	0	1	0.25	0.01	0	0.75	0
C2988	AUTOMATIC	0	0	0	0	0	1	0.25	0.01	0	0.75	0
C74	AUTOMATIC	0	0	0	0	0	1	0.07	0.86	0.07	0.49	0
C2592	AUTOMATIC	0	0	0	0	0	1	0.26	0.08	0.01	0.66	0
C2549	AUTOMATIC	0	0	0	0	0	1	0.07	0.32	0	0.87	0
C2547	AUTOMATIC	0	0	0	0	0	1	0.07	0.53	0	0.88	0
C2489	AUTOMATIC	0	0	0	0	0	1	0.11	0.87	0	0.88	0
C73	AUTOMATIC	0	0	0	0	0	1	0.09	0.5	0.41	0	0
C72	AUTOMATIC	0	0	0	0	0	1	0.09	0.54	0.37	0.5	0
C57	AUTOMATIC	0	0	0	0	0	1	0.12	0.5	0.38	0	0
C69	AUTOMATIC	0	0	0	0	0	1	0.07	0.63	0.3	0	0
C10	AUTOMATIC	0	0	0	0	0	1	0.04	0	0.47	0.89	0
C22348	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C58	AUTOMATIC	0	0	0	0	0	1	0.04	0.39	0	0.88	0
C27	AUTOMATIC	0	0	0	0	0	1	0.04	0.49	0.47	0	0
C76	AUTOMATIC	0	0	0	0	0	1	0.19	0.29	0.01	0.77	0
C77	AUTOMATIC	0	0	0	0	0	1	0.19	0.47	0.33	0	0

DRAFT

Table 2D: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C80	AUTOMATIC	0.01	0.01	0.41	0.42	0.01	1	0.1	0.82	0	0.02	0
C81_1	AUTOMATIC	0	0	0	0	0	1	0.18	0.5	0.32	0.52	0
C82	AUTOMATIC	0.01	0.23	0.01	0.35	0.01	1	0.18	0.31	0.02	0.66	0
C66	AUTOMATIC	0	0	0	0	0	1	0.16	0.84	0	0.5	0
C79	AUTOMATIC	0.03	0.35	0.03	0.36	0.03	1	0.08	0.5	0.42	0	0
C78	AUTOMATIC	0.3	0.3	0.35	0.01	0.01	1	0.08	0.32	0	0.79	0
C83	AUTOMATIC	0.19	0.28	0.19	0.19	0.19	1	0.19	0.48	0.33	0	0
C24	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C64	AUTOMATIC	0	0	0	0	0	1	0.15	0.5	0.34	0.51	0
C2414	AUTOMATIC	0	0	0	0	0	1	0.12	0.39	0	0.74	0
C2454	AUTOMATIC	0	0	0	0	0	1	0.11	0.39	0	0.88	0
C2406	AUTOMATIC	0	0	0	0	0	1	0.13	0.02	0	0.76	0
C6814	AUTOMATIC	0	0	0	0	0	1	0.54	0.12	0	0.75	0
C61	AUTOMATIC	0	0	0	0	0	1	0.2	0.02	0.24	0.51	0
C6816	AUTOMATIC	0	0	0	0	0	1	0.1	0.35	0.13	0.8	0
C68	AUTOMATIC	0	0	0	0	0	1	0.05	0.66	0.29	0.63	0
C6815	AUTOMATIC	0	0	0	0	0	1	0.5	0.35	0.11	0.52	0
C111	AUTOMATIC	0	0	0	0	0	1	0.88	0.04	0.01	0.75	0
C65	AUTOMATIC	0	0	0	0	0	1	0.15	0.5	0.35	0.01	0
C81_2	AUTOMATIC	0.01	0.01	0.22	0.01	0.01	1	0.19	0.02	0.31	0.75	0
C62	AUTOMATIC	0	0	0	0	0	1	0.2	0.49	0.31	0	0
C70	AUTOMATIC	0	0	0	0	0	1	0.19	0	0	0	0
C8	AUTOMATIC	0.01	0.01	0.01	0.59	0.01	1	0.06	0.64	0.3	0.07	0
C42	AUTOMATIC	0.01	0.01	0.8	0.01	0.01	1	0.02	0.87	0	0.86	0
C45	AUTOMATIC	0.4	0.4	0.8	0.01	0.01	1	0.02	0.48	0.01	0.96	0
C46	AUTOMATIC	0.01	0.01	0.4	0.01	0.01	1	0.51	0.01	0.48	0.97	0

Table 2D: Conduits tag not 2D or 2Dout (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C50	AUTOMATIC	0	0	0	0	0	1	0.02	0.5	0.49	0.97	0
C49	AUTOMATIC	0	0	0	0	0	1	0.02	0.61	0.3	0.91	0
C52	AUTOMATIC	0.01	0.01	0.8	0.01	0.01	1	0.02	0.5	0	0.98	0
C51	AUTOMATIC	0	0	0	0	0	1	0.5	0.14	0.36	0.49	0
C53	AUTOMATIC	0	0	0	0	0	1	0.51	0.49	0	0.98	0
C18	AUTOMATIC	0.66	0.66	36.62	0.27	0.35	1	0.02	0.83	0.15	0.83	0
C7	AUTOMATIC	0.01	0.56	0.01	1.04	0.01	1	0.06	0.92	0	0.65	0
C6	AUTOMATIC	0.56	0.72	0.56	1.08	0.56	1	0.06	0.94	0	0.58	0
C4	AUTOMATIC	1.8	1.87	1.8	1.8	1.8	1	0.05	0.64	0.31	0.53	0
C40	AUTOMATIC	0	0	0	0	0	1	0.11	0.89	0	0.01	0
C41	AUTOMATIC	0	0	0	0	0	1	0.11	0.87	0	0.01	0
C7147	AUTOMATIC	0	0	0	0	0	1	0.06	0.29	0.24	0.58	0
C26	AUTOMATIC	0	0	0	0	0	1	0.9	0	0	0	0
C141	AUTOMATIC	1.05	1.05	1.06	0.01	0.02	1	0.05	0.02	0	0	0
C2314	AUTOMATIC	0.39	0.4	0.44	0.01	0.01	1	0.03	0.1	0	0	0
C19	AUTOMATIC	0	0	0	0	0	1	0.54	0.2	0.1	0.74	0

Table 2E: Conduits tag not 2D or 2Dout

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
_C101	0	0		0	0	0	0	0	0	0	0	0
C33	0	0		0	0	0	0	0	0	0	0	0
C11	0	0		0	0	0	0	0	0	0	0	0
C5	0	0		0	0	0	0	0	0	0	0	0
C2	0	0		0	0	0	0	0	0	0	0	0
C1	0	0		0	0	0	0	0	0	0	0	0
C3	0	0		0	0	0	0	0	0	0	0	0
C13	0	0		0	0	0	0	0	0	0	0	0
C39	0	0		0	0	0	0	0	0	0	0	0
C44	0	0		0	0	0	0	0	0	0	0	0
C38	0	0		0	0	0	0	0	0	0	0	0
C12	0	0		0	0	0	0	0	0	0	0	0
C37	0	0		0	0	0	0	0	0	0	0	0
C47	0	0		0	0	0	0	0	0	0	0	0
C48	0	0		0	0	0	0	0	0	0	0	0
C43	0	0		0	0	0	0	0	0	0	0	0
C56	0	0		0	0	0	0	0	0	0	0	0
C31	0	0		0	0	0	0	0	0	0	0	0
C54	0	0		0	0	0	0	0	0	0	0	0
C55	0	0		0	0	0	0	0	0	0	0	0
_C102	0	0		0	0	0	0	0	0	0	0	0
C107	0	0		0	0	0	0	0	0	0	0	0
C28	0	0		0	0	0	0	0	0	0	0	0
C25	0	0		0	0	0	0	0	0	0	0	0
C23	0	0		0	0	0	0	0	0	0	0	0
C22	0	0		0	0	0	0	0	0	0	0	0

Hydra

Table 2E: Conduits tag not 2D or 2Dout (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C115	0	0		0	0	0	0	0	0	0	0	0
C105	0	0		0	0	0	0	0	0	0	0	0
C21	0	0		0	0	0	0	0	0	0	0	0
C109	0	0		0	0	0	0	0	0	0	0	0
C103_1	0	0		0	0	0	0	0	0	0	0	0
C1418	0	0		0	0	0	0	0	0	0	0	0
C97	0	0		0	0	0	0	0	0	0	0	0
C16	0	0		0	0	0	0	0	0	0	0	0
_C107	0	0		0	0	0	0	0	0	0	0	0
C15	0	0		0	0	0	0	0	0	0	0	0
C103	0	0		0	0	0	0	0	0	0	0	0
C90	0	0		0	0	0	0	0	0	0	0	0
C17	0	0		0	0	0	0	0	0	0	0	0
C155	0	0		0	0	0	0	0	0	0	0	0
C92	0	0		0	0	0	0	0	0	0	0	0
_C105	0	0		0	0	0	0	0	0	0	0	0
C14	0	0		0	0	0	0	0	0	0	0	0
C30	0	0		0	0	0	0	0	0	0	0	0
C20	0	0		0	0	0	0	0	0	0	0	0
C19_2	0	0		0	0	0	0	0	0	0	0	0
C67	0	0		0	0	0	0	0	0	0	0	0
C71	0	0		0	0	0	0	0	0	0	0	0
C22328	0	0		0	0	0	0	0	0	0	0	0
C59	0	0		0	0	0	0	0	0	0	0	0
C22244	0	0		0	0	0	0	0	0	0	0	0
C22267	0	0		0	0	0	0	0	0	0	0	0

Hydra

Table 2E: Conduits tag not 2D or 2Dout (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C22143	0	0		0	0	0	0	0	0	0	0	0
C9	0	0		0	0	0	0	0	0	0	0	0
C60	0	0		0	0	0	0	0	0	0	0	0
C21144	0	0		0	0	0	0	0	0	0	0	0
C21018	0	0		0	0	0	0	0	0	0	0	0
C21134	0	0		0	0	0	0	0	0	0	0	0
C21048	0	0		0	0	0	0	0	0	0	0	0
C21088	0	0		0	0	0	0	0	0	0	0	0
C75	0	0		0	0	0	0	0	0	0	0	0
C21017	0	0		0	0	0	0	0	0	0	0	0
C2988	0	0		0	0	0	0	0	0	0	0	0
C74	0	0		0	0	0	0	0	0	0	0	0
C2592	0	0		0	0	0	0	0	0	0	0	0
C2549	0	0		0	0	0	0	0	0	0	0	0
C2547	0	0		0	0	0	0	0	0	0	0	0
C2489	0	0		0	0	0	0	0	0	0	0	0
C73	0	0		0	0	0	0	0	0	0	0	0
C72	0	0		0	0	0	0	0	0	0	0	0
C57	0	0		0	0	0	0	0	0	0	0	0
C69	0	0		0	0	0	0	0	0	0	0	0
C10	0	0		0	0	0	0	0	0	0	0	0
C22348	0	0		0	0	0	0	0	0	0	0	0
C58	0	0		0	0	0	0	0	0	0	0	0
C27	0	0		0	0	0	0	0	0	0	0	0
C76	0	0		0	0	0	0	0	0	0	0	0
C77	0	0		0	0	0	0	0	0	0	0	0

Hydra

Table 2E: Conduits tag not 2D or 2Dout (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C80	0	0		0	0	0	0	0	0	0	0	0
C81_1	0	0		0	0	0	0	0	0	0	0	0
C82	0	0		0	0	0	0	0	0	0	0	0
C66	0	0		0	0	0	0	0	0	0	0	0
C79	0	0		0	0	0	0	0	0	0	0	0
C78	0	0		0	0	0	0	0	0	0	0	0
C83	0	0		0	0	0	0	0	0	0	0	0
C24	0	0		0	0	0	0	0	0	0	0	0
C64	0	0		0	0	0	0	0	0	0	0	0
C2414	0	0		0	0	0	0	0	0	0	0	0
C2454	0	0		0	0	0	0	0	0	0	0	0
C2406	0	0		0	0	0	0	0	0	0	0	0
C6814	0	0		0	0	0	0	0	0	0	0	0
C61	0	0		0	0	0	0	0	0	0	0	0
C6816	0	0		0	0	0	0	0	0	0	0	0
C68	0	0		0	0	0	0	0	0	0	0	0
C6815	0	0		0	0	0	0	0	0	0	0	0
C111	0	0		0	0	0	0	0	0	0	0	0
C65	0	0		0	0	0	0	0	0	0	0	0
C81_2	0	0		0	0	0	0	0	0	0	0	0
C62	0	0		0	0	0	0	0	0	0	0	0
C70	0	0		0	0	0	0	0	0	0	0	0
C8	0	0		0	0	0	0	0	0	0	0	0
C42	0	0		0	0	0	0	0	0	0	0	0
C45	0	0		0	0	0	0	0	0	0	0	0
C46	0	0		0	0	0	0	0	0	0	0	0

Hold

Table 2E: Conduits tag not 2D or 2Dout (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C50	0	0		0	0	0	0	0	0	0	0	0
C49	0	0		0	0	0	0	0	0	0	0	0
C52	0	0		0	0	0	0	0	0	0	0	0
C51	0	0		0	0	0	0	0	0	0	0	0
C53	0	0		0	0	0	0	0	0	0	0	0
C18	0	0		0	0	0	0	0	0	0	0	0
C7	0	0		0	0	0	0	0	0	0	0	0
C6	0	0		0	0	0	0	0	0	0	0	0
C4	0	0		0	0	0	0	0	0	0	0	0
C40	0	0		0	0	0	0	0	0	0	0	0
C41	0	0		0	0	0	0	0	0	0	0	0
C7147	0	0		0	0	0	0	0	0	0	0	0
C26	0	0		0	0	0	0	0	0	0	0	0
C141	0	0		0	0	0	0	0	0	0	0	0
C2314	0	0		0	0	0	0	0	0	0	0	0
C19	0	0		0	0	0	0	0	0	0	0	0

Filed

Table 2F: Conduits tag not 2D or 2Dout

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_C101	0	11.111	0	1
C33	0	3.894	0	1
C11	0	8.687	0	1
C5	0	13.308	0	1
C2	0	143.639	0	1
C1	0	80.286	0	1
C3	0	75.585	0	1
C13	0	7.798	0	1
C39	0	16.539	0	1
C44	0	8.317	0	1
C38	0	6.346	0	1
C12	0	14.69	0	1
C37	0	4.651	0	1
C47	0	4.255	0	1
C48	0	16.408	0	1
C43	0	12.41	0	1
C56	0	6.024	0	1
C31	0	9.725	0	1
C54	0	14.707	0	1
C55	0	6.283	0	1
_C102	0	23.687	0	1
C107	0	29.248	0	1
C28	0	29.138	0	1
C25	0	15.666	0	1
C23	0	29.838	0	1
C22	0	23.59	0	1

Draft

Table 2F: Conduits tag not 2D or 2Dout (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C115	0	21.474	0	1
C105	0	8.964	0	1
C21	0	61.898	0	1
C109	0	80.984	0	1
C103_1	0	50.893	0	1
C1418	0	17.711	0	1
C97	0	8.706	0	1
C16	0	14.904	0	1
_C107	0	16.672	0	1
C15	0	34.942	0	1
C103	0	4.382	0	1
C90	0	21.427	0	1
C17	0	32.839	0	1
C155	0	66.234	0	1
C92	0	11.948	0	1
_C105	0	44.375	0	1
C14	0	66.141	0	1
C30	0	13.372	0	1
C20	0	7.292	0	1
C19_2	0	9.938	0	1
C67	0	19.796	0	1
C71	0	21.106	0	1
C22328	0	9.908	0	1
C59	0	10.812	0	1
C22244	0	16.784	0	1
C22267	0	10.634	0	1

Draft

Table 2F: Conduits tag not 2D or 2Dout (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C22143	0	10.526	0	1
C9	0	20.69	0	1
C60	0	37.396	0	1
C21144	0	7.334	0	1
C21018	0	11.283	0	1
C21134	0	11.719	0	1
C21048	0	13.528	0	1
C21088	0	16.208	0	1
C75	0	18.316	0	1
C21017	0	8.808	0	1
C2988	0	14.82	0	1
C74	0	22.898	0	1
C2592	0	8.842	0	1
C2549	0	12.941	0	1
C2547	0	12.739	0	1
C2489	0	11.883	0	1
C73	0	16.198	0	1
C72	0	22.939	0	1
C57	0	18.673	0	1
C69	0	16.096	0	1
C10	0	63.364	0	1
C22348	0	15.24	0	1
C58	0	38.297	0	1
C27	0	5.088	0	1
C76	0	21.39	0	1
C77	0	22.684	0	1

Draft

Table 2F: Conduits tag not 2D or 2Dout (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C80	0	25.75	0	1
C81_1	0	63.577	0	1
C82	0	34.523	0	1
C66	0	23.027	0	1
C79	0	15.492	0	1
C78	0	16.12	0	1
C83	0	6.549	0	1
C24	0	30.019	0	1
C64	0	21.578	0	1
C2414	0	15.24	0	1
C2454	0	15.241	0	1
C2406	0	15.06	0	1
C6814	0	91.879	0	1
C61	0	21.536	0	1
C6816	0	8.85	0	1
C68	0	23.439	0	1
C6815	0	51.67	0	1
C111	0	80.426	0	1
C65	0	20.515	0	1
C81_2	0	58.913	0	1
C62	0	20.62	0	1
C70	0	23.672	0	1
C8	0	6.125	0	1
C42	0	11.966	0	1
C45	0	37.311	0	1
C46	0	25.797	0	1

Draft

Table 2F: Conduits tag not 2D or 2Dout (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C50	0	67.039	0	1
C49	0	64.613	0	1
C52	0	131.742	0	1
C51	0	35.426	0	1
C53	0	40.957	0	1
C18	0	147.118	0	1
C7	0	57.954	0	1
C6	0	34.898	0	1
C4	0	36.353	0	1
C40	0	7.713	0	1
C41	0	7.051	0	1
C7147	0	93.029	0	1
C26	0	54.176	0	1
C141	0	5.175	0	1
C2314	0	2.493	0	1
C19	0	30.413	0	1

DRAFT

Table 3A: ARM Subcatchments

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S1	1010487.317	2847818.725	Zone 2		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB2	0.913	300	3.519
S10	1005708.415	2844682.934	Zone 1		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J20	0.352	300	8.406
S103_1	1007362.004	2845719.622	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J25	0.781	300	11.045
S103_2	1007058.318	2845579.838	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J1	0.636	300	14.154
S106	1011862.971	2845745.351	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH13	0.436	300	5.668
S11	1011368.787	2845042.386	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB30	0.24	300	11.124
S112	1011765.715	2845607.459	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH12	0.576	300	11.629
S117	1006645.061	2845292.582	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J8	1.28	300	7.392
S119	1011710.229	2845450.521	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB32	0.487	300	13.311
S12	1009155.269	2846806.185	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J28	1.163	300	11.343
S121	1006652.612	2845362.099	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J4	0.365	300	7.731
S122	1011582.402	2845423.142	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH11	0.033	300	5.762
S123_1	1011641.466	2845102.141	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB33	5.513	300	8.307
S126	1006771.027	2845326.81	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J7	0.373	300	8.112
S128_1	1011314.008	2844967.879	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB29	0.912	300	6.141
S128_3	1011439.667	2845206.557	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB27	0.082	300	5.357
S128_4	1011509.295	2845310.923	Zone 6	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	cb28	0.069	300	3.231
S13	1010995.082	2845155.655	Zone 5		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J428	9.522	300	9.391
S130	1006150.145	2845207.413	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J5	1.595	300	27.808
S135	1006040.366	2844957.721	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J13	0.89	300	15.026
S135_2	1005799.316	2844651.484	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J12	0.528	300	15.451
S135_4	1005715.768	2844640.674	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J12	0.218	300	10.886
S138	1006093.058	2844885.605	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J11	0.718	300	12.176
S14	1010073.132	2846967.657	Zone 1		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	OF-RS-13-S	8.285	300	10.506
S141	1011205.465	2844879.436	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH15	0.124	300	4.749
S2	1010278.468	2848203.067	Zone 2	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DuckPond	26.281	300	10.923

Table 3A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S2_1	1010537.761	2846249.488	Zone 4	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	_CourtStWetlandArea	0.379	300	16.627
S2_3	1010958.977	2846249.347	Zone 4	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB4	10.8	300	12.201
S23	1009578.801	2847171.57	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB36	0.524	300	10.193
S25	1010728.262	2847636.033	Zone 2	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH4	2.032	300	5.744
S26	1010339.143	2847226.97	Zone 3	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-10	0.546	300	3.813
S26_1	1010334.853	2847481.827	Zone 3	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-07	0.38	300	6.003
S30	1011355.912	2847415.335	Zone 2	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB104	4.405	300	11.115
S32	1010496.691	2847333.793	Zone 3	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-07	2.027	300	6.639
S33	1010881.808	2847329.337	Zone 2	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J611	8.854	300	10.761
S36	1011722.209	2847132.617	Zone 2	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB105	12.204	300	9.923
S46_2	1009603.012	2847123.201	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB37	0.538	300	4.621
S49_1	1010739.79	2846918.195	Zone 4	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-12	3.133	300	10.21
S49_6	1010444.732	2846453.095	Zone 4	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-14	0.451	300	8.23
S49_8	1010511.018	2846349.272	Zone 4	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-18	0.18	300	4.348
S52_2	1009925.542	2847338.791	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J30	0.249	300	3.955
S53	1011172.364	2846593.041	Zone 4	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J155	3.103	300	17.273
S6	1005494.968	2844432.915	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J22	0.279	300	8.507
S6_1	1008971.765	2846458.918	Zone 1		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J6	1.238	300	9.56
S6_3	1009439.368	2846742.738	Zone 1		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J27	4.78	300	12.857
S6_4	1009688.465	2847016.819	Zone 1		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	CB38	1.549	300	10.774
S7	1011037.519	2844670.263	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH17	0.125	300	9.111
S70_2	1010722.908	2845836.1	Zone 5	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-27	2.87	300	7.148
S75_2	1008565.796	2846294.473	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J6	1.627	300	11.794
S76_1	1011305.239	2845685.652	Zone 6	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J1364	5.302	300	12.888
S8	1005452.29	2844454.885	Zone 1		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J18	0.372	300	7.857
S80_1	1010894.296	2845731.405	Zone 5	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-28	0.578	300	4.766

Table 3A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S9	1011213.411	2844798.075	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH16	0.38	300	3.94
S90_1	1008157.655	2846015.314	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J17	0.138	300	5.266
S90_2	1008454.394	2846213.676	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J10	0.441	300	10.746
S97_2	1007093.128	2845499.64	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J3	0.299	300	6.44
S99_2	1007877.635	2845863.999	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J15	0.25	300	2.582
R1_1	1009851.312	2847349.892	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J31	0.487	300	6.426
R3_1	1010928.282	2845597.979	Zone 5	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-28	0.308	300	4.658
R3_3	1010998.99	2845602.639	Zone 5	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-30	0.039	300	4.658
R3_4	1011035.64	2845660.735	Zone 6	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	WinthropPond	0.788	300	4.66
S98_3	1011974.591	2845873.89	Zone 6	Zone 6	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	MH14	0.201	300	13.371
R4_1	1007726.109	2845836.765	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J26	2.024	300	10.977
R4_2	1007900.864	2846047.495	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	OF-RS-9-N	0.479	300	10.988
R5	1009128.388	2847062.777	Zone 1		SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J29	1.586	300	10.734
S49	1010546.598	2846694.16	Zone 4	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-13	3.721	300	9.517
S26_3	1010180.612	2847427.572	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J30	1.572	300	6.225
S26_4	1010447.729	2847688.329	Zone 3	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-03	0.733	300	6.225
S28_1	1010049.406	2847533.073	Zone 1	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	J31	0.445	300	8.722
S28_2	1010238.884	2847650.034	Zone 3	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	Rt6Drywells	0.306	300	8.722
S5_1	-7813761.169	5168224.587	Zone 5	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	DMH-32	0.67	300	5.645
S5_2	-7813851.306	5168311.825	Zone 6	WDT	SCS Dimensionless UH	10yr24hr_NOAA_4.6in	WinthropPond	0.414	300	5.645

Table 3B: ARM Subcatchments

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.002	SCS CN
S10	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S103_1	0	0.05	11.618	3	0.5	4	7	0	1.93	4.739	0.413	User entered value	5	SCS CN
S103_2	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S106	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.041	SCS CN
S11	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S112	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S117	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.198	SCS CN
S119	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S12	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	6.7	SCS CN
S121	0	0.05	11.504	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S122	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S123_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S126	0	0.05	11.514	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.008	SCS CN
S128_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S128_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S128_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S13	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	9.7	SCS CN
S130	0	0.05	12.119	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.3	SCS CN
S135	0	0.05	11.577	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_2	0	0.05	11.529	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_4	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S138	0	0.05	11.53	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S14	0	0.05	12.22	3	0.5	4	7	0	1.982	4.347	0.41	User entered value	6.698	SCS CN
S141	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S2	0	0.05	12.46	3	0.5	4	7	0	2.868	2.723	0.397	User entered value	12.8	SCS CN

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Table 3B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S2_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S2_3	0	0.05	11.581	3	0.5	4	7	0	2.396	1.208	0.39	User entered value	6.5	SCS CN
S23	0	0.05	11.5	3	0.5	4	7	0	1.932	4.728	0.413	User entered value	5	SCS CN
S25	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	13.9	SCS CN
S26	0	0.05	12.536	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S26_1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S30	0	0.05	11.99	3	0.5	4	7	0	2.008	4.151	0.409	User entered value	7.3	SCS CN
S32	0	0.05	11.5	3	0.5	4	7	0	1.944	4.631	0.412	User entered value	5.9	SCS CN
S33	0	0.05	11.93	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	15.1	SCS CN
S36	0	0.05	11.541	3	0.5	4	7	0	2.24	2.389	0.398	User entered value	24.9	SCS CN
S46_2	0	0.05	11.513	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S49_1	0	0.05	11.624	3	0.5	4	7	0	2.124	3.271	0.404	User entered value	17.9	SCS CN
S49_6	0	0.05	11.5	3	0.5	4	7	0	2.264	2.207	0.397	User entered value	5	SCS CN
S49_8	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S52_2	0	0.05	11.5	3	0.5	4	7	0	2.199	2.7	0.4	User entered value	5.001	SCS CN
S53	0	0.05	11.5	3	0.5	4	7	0	2.161	2.99	0.402	User entered value	5	SCS CN
S6	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S6_1	0	0.05	12.367	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.2	SCS CN
S6_3	0	0.05	12.239	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S6_4	0	0.05	11.509	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S7	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S70_2	0	0.05	11.504	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S75_2	0	0.05	12.11	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	8.2	SCS CN
S76_1	0	0.05	11.623	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	7.6	SCS CN
S8	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S80_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

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Table 3B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S9	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S90_1	0	0.05	12.035	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S90_2	0	0.05	11.63	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S97_2	0	0.05	11.726	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S99_2	0	0.05	11.942	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.243	SCS CN
R1_1	0	0.05	11.5	3	0.5	4	7	0	2.111	3.37	0.404	User entered value	5	SCS CN
R3_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S98_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R4_1	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	27.172	SCS CN
R4_2	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
R5	0	0.05	12.229	3	0.5	4	7	0	2.154	3.045	0.402	User entered value	5	SCS CN
S49	0	0.05	11.531	3	0.5	4	7	0	2.222	2.528	0.399	User entered value	5	SCS CN
S26_3	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.199	SCS CN
S26_4	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S28_1	0	0.05	11.846	3	0.5	4	7	0	2.268	4.014	0.407	User entered value	5	SCS CN
S28_2	0	0.05	11.846	3	0.5	4	7	0	2.268	4.014	0.407	User entered value	5	SCS CN
S5_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S5_2	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

Table 3C: ARM Subcatchments

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S1	0.2 S	0.341	85.437	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S10	0.2 S	0.143	93.311	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_1	0.2 S	0.954	67.694	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_2	0.2 S	1.069	65.171	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S106	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S11	0.2 S	0.053	97.442	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S112	0.2 S	0.172	92.078	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S117	0.2 S	0.757	72.555	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S119	0.2 S	0.263	88.363	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S12	0.2 S	1.682	54.323	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S121	0.2 S	0.479	80.683	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S122	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S123_1	0.2 S	0.167	92.274	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S126	0.2 S	0.437	82.083	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_1	0.2 S	0.069	96.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_3	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_4	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S13	0.2 S	0.79	71.684	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S130	0.2 S	2.219	47.407	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135	0.2 S	0.47	80.956	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_2	0.2 S	0.633	75.95	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_4	0.2 S	0.076	96.349	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S138	0.2 S	0.501	79.966	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S14	0.2 S	0.674	74.802	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S141	0.2 S	0.159	92.649	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2	0.2 S	1.716	53.822	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 3C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S2_1	0.2 S	1.5	57.14	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2_3	0.2 S	0.628	76.108	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S23	0.2 S	0.992	66.854	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S25	0.2 S	0.429	82.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26	0.2 S	0.116	94.511	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_1	0.2 S	0.31	86.57	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S30	0.2 S	1.372	59.304	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S32	0.2 S	0.483	80.561	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S33	0.2 S	0.979	67.134	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S36	0.2 S	1.122	64.068	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S46_2	0.2 S	2.628	43.214	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_1	0.2 S	0.276	87.865	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_6	0.2 S	0.163	92.468	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_8	0.2 S	0.099	95.301	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S52_2	0.2 S	0.193	91.191	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S53	0.2 S	0.547	78.512	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6	0.2 S	0.309	86.616	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_1	0.2 S	2.361	45.862	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_3	0.2 S	1.676	54.401	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_4	0.2 S	1.215	62.204	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S7	0.2 S	0.043	97.919	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S70_2	0.2 S	0.375	84.193	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S75_2	0.2 S	0.915	68.606	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S76_1	0.2 S	0.778	71.999	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S8	0.2 S	0.327	85.953	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S80_1	0.2 S	0.133	93.776	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 3C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S9	0.2 S	0.048	97.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_1	0.2 S	0.221	90.05	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_2	0.2 S	0.712	73.746	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S97_2	0.2 S	0.51	79.69	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S99_2	0.2 S	0.148	93.108	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R1_1	0.2 S	0.679	74.65	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_1	0.2 S	0.216	90.243	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_3	0.2 S	0.106	94.961	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_4	0.2 S	0.563	78.027	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S98_3	0.2 S	0.214	90.344	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R4_1	0.2 S	0.703	73.983	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R4_2	0.2 S	3.561	35.964	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R5	0.2 S	0.652	75.409	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49	0.2 S	0.294	87.195	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_3	0.2 S	0.46	81.302	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_4	0.2 S	0.382	83.98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S28_1	0.2 S	0.761	72.45	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S28_2	0.2 S	0.359	84.783	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S5_1	0.2 S	0.07	96.61	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S5_2	0.2 S	1.061	65.34	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 3D: ARM Subcatchments

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S1	0.1	2017			No	0	0	0	0	4.596	1.558	3.065	0.076	2.734
S10	0.1	2017			No	0	0	0	0	4.596	0.761	3.871	0.037	1.257
S103_1	0.1	2017			No	0	0	0	0	4.596	3.02	1.591	0.034	1.186
S103_2	0.1	2017			No	0	0	0	0	4.596	3.194	1.415	0.024	0.84
S106	0.1	2017			No	0	0	0	0	4.596	0.236	4.402	0.052	1.647
S11	0.1	2017			No	0	0	0	0	4.596	0.301	4.335	0.028	0.903
S112	0.1	2017			No	0	0	0	0	4.596	0.892	3.738	0.058	2.013
S117	0.1	2017			No	0	0	0	0	4.596	2.662	1.933	0.067	2.126
S119	0.1	2017			No	0	0	0	0	4.596	1.273	3.354	0.044	1.572
S12	0.1	2017			No	0	0	0	0	4.596	3.846	0.766	0.024	0.613
S121	0.1	2017			No	0	0	0	0	4.596	1.993	2.628	0.026	0.948
S122	0.1	2017			No	0	0	0	0	4.596	0.236	4.401	0.004	0.125
S123_1	0.1	2017			No	0	0	0	0	4.596	0.872	3.76	0.563	19.336
S126	0.1	2017			No	0	0	0	0	4.596	1.868	2.754	0.028	1.013
S128_1	0.1	2017			No	0	0	0	0	4.596	0.391	4.244	0.105	3.408
S128_3	0.1	2017			No	0	0	0	0	4.596	0.236	4.401	0.01	0.31
S128_4	0.1	2017			No	0	0	0	0	4.596	0.236	4.4	0.008	0.261
S13	0.1	2017			No	0	0	0	0	4.596	2.728	1.858	0.481	15.16
S130	0.1	2017			No	0	0	0	0	4.596	4.177	0.422	0.018	0.303
S135	0.1	2017			No	0	0	0	0	4.596	1.969	2.652	0.064	2.331
S135_2	0.1	2017			No	0	0	0	0	4.596	2.393	2.224	0.032	1.159
S135_4	0.1	2017			No	0	0	0	0	4.596	0.425	4.21	0.025	0.812
S138	0.1	2017			No	0	0	0	0	4.596	2.055	2.564	0.05	1.821
S14	0.1	2017			No	0	0	0	0	4.596	2.486	2.155	0.485	16.708
S141	0.1	2017			No	0	0	0	0	4.596	0.832	3.799	0.013	0.438
S2	0.1	2017			No	0	0	0	0	4.596	3.872	0.719	0.513	11.478

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Table 3D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S2_1	0.1	2017			No	0	0	0	0	4.596	3.692	0.913	0.009	0.276
S2_3	0.1	2017			No	0	0	0	0	4.596	2.381	2.256	0.662	23.035
S23	0.1	2017			No	0	0	0	0	4.596	3.079	1.531	0.022	0.761
S25	0.1	2017			No	0	0	0	0	4.596	1.844	2.741	0.151	4.603
S26	0.1	2017			No	0	0	0	0	4.596	0.63	4.003	0.059	1.987
S26_1	0.1	2017			No	0	0	0	0	4.596	1.449	3.177	0.033	1.173
S30	0.1	2017			No	0	0	0	0	4.596	3.566	1.056	0.126	3.619
S32	0.1	2017			No	0	0	0	0	4.596	2.003	2.612	0.144	5.117
S33	0.1	2017			No	0	0	0	0	4.596	3.059	1.525	0.367	10.147
S36	0.1	2017			No	0	0	0	0	4.596	3.267	1.329	0.44	10.397
S46_2	0.1	2017			No	0	0	0	0	4.596	4.34	0.259	0.004	0.041
S49_1	0.1	2017			No	0	0	0	0	4.596	1.323	3.277	0.279	7.645
S49_6	0.1	2017			No	0	0	0	0	4.596	0.851	3.78	0.046	1.587
S49_8	0.1	2017			No	0	0	0	0	4.596	0.543	4.091	0.02	0.662
S52_2	0.1	2017			No	0	0	0	0	4.596	0.985	3.644	0.025	0.855
S53	0.1	2017			No	0	0	0	0	4.596	2.18	2.439	0.205	7.484
S6	0.1	2017			No	0	0	0	0	4.596	1.445	3.181	0.024	0.862
S6_1	0.1	2017			No	0	0	0	0	4.596	4.24	0.359	0.012	0.178
S6_3	0.1	2017			No	0	0	0	0	4.596	3.842	0.761	0.099	2.577
S6_4	0.1	2017			No	0	0	0	0	4.596	3.387	1.22	0.051	1.697
S7	0.1	2017			No	0	0	0	0	4.596	0.246	4.392	0.015	0.472
S70_2	0.1	2017			No	0	0	0	0	4.596	1.675	2.949	0.23	8.3
S75_2	0.1	2017			No	0	0	0	0	4.596	2.955	1.664	0.074	2.304
S76_1	0.1	2017			No	0	0	0	0	4.596	2.704	1.939	0.279	9.202
S8	0.1	2017			No	0	0	0	0	4.596	1.509	3.116	0.031	1.13
S80_1	0.1	2017			No	0	0	0	0	4.596	0.711	3.922	0.062	2.08

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Table 3D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S9	0.1	2017			No	0	0	0	0	4.596	0.276	4.36	0.045	1.432
S90_1	0.1	2017			No	0	0	0	0	4.596	1.103	3.525	0.013	0.463
S90_2	0.1	2017			No	0	0	0	0	4.596	2.57	2.046	0.024	0.887
S97_2	0.1	2017			No	0	0	0	0	4.596	2.079	2.54	0.021	0.751
S99_2	0.1	2017			No	0	0	0	0	4.596	0.783	3.843	0.026	0.885
R1_1	0.1	2017			No	0	0	0	0	4.596	2.498	2.118	0.028	1.016
R3_1	0.1	2017			No	0	0	0	0	4.596	1.083	3.545	0.03	1.037
R3_3	0.1	2017			No	0	0	0	0	4.596	0.581	4.053	0.004	0.143
R3_4	0.1	2017			No	0	0	0	0	4.596	2.221	2.397	0.051	1.868
S98_3	0.1	2017			No	0	0	0	0	4.596	1.073	3.556	0.019	0.678
R4_1	0.1	2017			No	0	0	0	0	4.596	2.551	2.046	0.112	2.752
R4_2	0.1	2017			No	0	0	0	0	4.596	4.539	0.057	0.001	0.003
R5	0.1	2017			No	0	0	0	0	4.596	2.437	2.18	0.094	3.409
S49	0.1	2017			No	0	0	0	0	4.596	1.389	3.237	0.327	11.671
S26_3	0.1	2017			No	0	0	0	0	4.596	1.938	2.657	0.113	3.634
S26_4	0.1	2017			No	0	0	0	0	4.596	1.695	2.929	0.058	2.107
S28_1	0.1	2017			No	0	0	0	0	4.596	2.67	1.944	0.023	0.847
S28_2	0.1	2017			No	0	0	0	0	4.596	1.62	3.004	0.025	0.9
S5_1	0.1	2017			No	0	0	0	0	4.596	0.396	4.239	0.077	2.503
S5_2	0.1	2017			No	0	0	0	0	4.596	3.182	1.427	0.016	0.552

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Table 3E: ARM Subcatchments

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S1	0.667	315.069	3688.787	1
S10	0.842	269.666	1423.459	1
S103_1	0.346	377.028	3159.303	1
S103_2	0.308	295.706	2574.745	1
S106	0.958	233.481	1631.88	1
S11	0.943	168.535	969.45	1
S112	0.813	307.634	2332.704	1
S117	0.421	712.861	5180.467	1
S119	0.73	179.431	1969.813	1
S12	0.167	494.459	4707.633	1
S121	0.572	270.8	1476.259	1
S122	0.958	59.644	132.225	1
S123_1	0.818	668.642	22309.393	1
S126	0.599	304.22	1500.539	1
S128_1	0.923	362.657	3683.22	1
S128_3	0.958	88.73	333.025	1
S128_4	0.957	131.285	280.734	1
S13	0.404	895.981	38534.838	1
S130	0.092	622.887	6453.473	1
S135	0.577	370.13	3603.291	1
S135_2	0.484	315.527	2135.183	1
S135_4	0.916	194.92	883.385	1
S138	0.558	345.481	2904.866	1
S14	0.469	796.88	33566.433	1
S141	0.827	100.226	495.075	1
S2	0.157	1627.441	106358.672	1

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Table 3E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S2_1	0.199	157.843	1534.804	1
S2_3	0.491	1284.924	43708.974	1
S23	0.333	289.85	2122.072	1
S25	0.596	572.013	8217.123	1
S26	0.871	226.137	2209.877	1
S26_1	0.691	210.057	1536.428	1
S30	0.23	617.351	17821.744	1
S32	0.568	756.561	8203.518	1
S33	0.332	1019.231	35810.985	1
S36	0.289	1284.844	49364.997	1
S46_2	0.056	317.357	1711.653	1
S49_1	0.713	824.311	12680.818	1
S49_6	0.823	195.824	1823.61	1
S49_8	0.89	121.828	726.955	1
S52_2	0.793	208.657	1007.1	1
S53	0.531	693.413	12557.385	1
S6	0.692	201.685	1127.756	1
S6_1	0.078	349.322	5010.388	1
S6_3	0.166	667.94	19372.264	1
S6_4	0.265	354.418	6315.075	1
S7	0.956	129.15	502.961	1
S70_2	0.642	717.708	11615.95	1
S75_2	0.362	1002.106	6583.03	1
S76_1	0.422	859.132	21455.902	1
S8	0.678	242.966	1506.778	1
S80_1	0.853	242.097	2340.437	1

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Table 3E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S9	0.949	211.337	1535.98	1
S90_1	0.767	153.485	557.903	1
S90_2	0.445	338.375	1784.976	1
S97_2	0.553	294.868	1210.755	1
S99_2	0.836	267.109	928.72	1
R1_1	0.461	234.206	1969.851	1
R3_1	0.771	147.113	1245.434	1
R3_3	0.882	49.68	159.372	1
R3_4	0.522	353.112	3185.744	1
S98_3	0.774	178.953	814.244	1
R4_1	0.445	785.818	8199.973	1
R4_2	0.012	257.642	1939.276	1
R5	0.474	347.858	6416.274	1
S49	0.704	673.495	15059.147	2
S26_3	0.578	327.093	6360.744	1
S26_4	0.637	358.119	2966.598	1
S28_1	0.423	229.348	1802.078	1
S28_2	0.654	166.11	1238.128	1
S5_1	0.922	324.692	2712.267	1
S5_2	0.311	258.975	1674.737	1

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Table 4A: Storages

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Evap. Factor (fraction)
_CourtStWetlandArea	1010552.018	2846243.243	Zone4	NO	NO	3	6	3	0	0	0	0
_PSWetWell	1010677.209	2846162.22		NO	NO	-13	9	22	0	0	0	0
_Rt6Basin&Forebay	1010262.67	2847770.047	Connect2D_Direct	NO	NO	3	8	5	0	0	0	0
DuckPond	1010546.203	2848276.711	Connect2D_Direct	NO	NO	4	5	1	0	0	0	0
DW#9	1011400.39	2845161.145		NO	NO	8.15	15.65	7.5	0	0	0	0
Rt6Drywells	1010162.878	2847622.97	Connect2D_Storage	NO	NO	4.07	10.7	6.63	0	0	0	0
SU1	1011236.875	2845492.701		NO	NO	3.84	7.93	4.09	0	0	0	0
WinthropPond	1011108.39	2845583.168	Zone6	NO	NO	1.5	4.5	3	0	0	0	0

Table 4B: Storages

Name	Storage Curve	Coefficient	Exponent	Constant (ft²)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series
_CourtStWetlandArea	TABULAR	1000	0	0	CourtStPond	0	0	0	0	0		
_PSWetWell	TABULAR	1000	0	0	PSWetWell	0	0	0	0	0		
_Rt6Basin&Forebay	TABULAR	1000	0	0	RetentionBasin&Forebay	0	0	0	0	0		
DuckPond	TABULAR	1000	0	0	DuckPond5ft	0	0	0	0	0		
DW#9	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0		
Rt6Drywells	TABULAR	1000	0	0	Rt6Drywells	0	0	0	0	0		
SU1	TABULAR	1000	0	0	Cultec150XLHD	0	0	0	0	0		
WinthropPond	TABULAR	1000	0	0	WinthropPond	0	0	0	0	0		

Table 4C: Storages

Name	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (fraction)	Avg. Depth (ft)	Max. Depth (ft)
_CourtStWetlandArea	1	0						0	0	0	0	2.37	3
_PSWetWell	1	0						0	0	0	0	2.86	18.85
_Rt6Basin&Forebay	1	0						0	1.93	4.74	0.413	1.11	3.48
DuckPond	1	0						0	0	0	0	0.39	0.55
DW#9	1	0						0	0	0	0	6.14	7.04
Rt6Drywells	1	0						0	1.93	4.74	0.413	0.92	3.86
SU1	1	0						0	1.93	4.74	0.413	0.14	1.69
WinthropPond	1	0						0	0	0	0	2.34	3

Table 4D: Storages

Name	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)
_CourtStWetlandArea	6	10/31/2018 11:48 AM	3	0.28	19.87	0.009	0.682	3.99	0	0	28	13.14	19.87
_PSWetWell	5.85	10/31/2018 12:11 PM	18.85	0	18.41	0	0.728	-0.018	0	0	3.15	48	0
_Rt6Basin&Forebay	6.48	10/31/2018 12:07 PM	3.48	0	19.7	0	1.03	0	0	0	2.62	0	0
DuckPond	4.55	11/01/2018 04:15 AM	0.55	11.48	18.03	0.513	1.13	0.004	0	0	0.95	0	0
DW#9	15.19	10/31/2018 12:05 PM	7.04	0	0.9	0	0.03	1.855	0	0	0.46	0	0
Rt6Drywells	7.93	10/31/2018 12:08 PM	3.86	0.9	0.9	0.025	0.025	-0.023	0	0	2.77	0	0
SU1	5.53	10/31/2018 12:14 PM	1.69	0	1.96	0	0.064	-0.019	0	0	2.4	0	0
WinthropPond	4.5	10/31/2018 12:06 PM	3	2.42	23.76	0.067	1.08	3.038	0	0	0	35.9	23.76

Table 4E: Storages

Name	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)
_CourtStWetlandArea	0.558	0	10.191	78	0	0	0	13.004	100	0	0	0
_PSWetWell	0	-3.146	-37.175	0	0	0	0	0	0	8.91	0	0
_Rt6Basin&Forebay	0	0	2.194	14	0	23	23	8.179	51	19.48	0	0
DuckPond	0	0	103.702	28	0	0	0	151.481	41	0	0	0
DW#9	0	0	0.244	81	0	0	0	0.282	93	0.91	0	0
Rt6Drywells	0	0	0.178	13	0	62	62	0.783	56	0.77	0	0
SU1	0	0	0.187	4	0	99	99	2.601	49	0.42	0	0
WinthropPond	0.767	0	29.581	78	0	0	0	38	100	0	0	0

Table 4F: Storages

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_CourtStWetlandArea	0	0	0	1
_PSWetWell	0	0	0	1
_Rt6Basin&Forebay	0	0	0	1
DuckPond	0	0	0	1
DW#9	0	0	0	1
Rt6Drywells	0	0	0	1
SU1	0	0	0	1
WinthropPond	0	0	0	1

Table 5A: Pumps

Name	Inlet Node	Outlet Node	Tag	Pump Curve	Initial Status	Startup Depth (ft)	Shutoff Depth (ft)	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)	Max/Full Flow	Utilized (%)	Start-Ups (num)
Pump1	_PSWetWell	StillingBasin		Constant2000gpm	OFF	4	1	NO	4.46	10/31/2018 09:58 AM	1	9.65	79
Pump2	_PSWetWell	StillingBasin		Constant2000gpm	OFF	5	1	NO	4.46	10/31/2018 11:49 AM	1	2.95	1

Table 5B: Pumps

Name	Min. Flow (cfs)	Avg. Flow (cfs)	Total Vol. (MG)	Power Usage	Below Curve (%)	Above Curve (%)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
Pump1	0	4.46	0.556	43.78	0	0	0	0	0	344.956	0	1
Pump2	0	4.46	0.17	9.05	0	0	0	0	0	347.306	0	1

Table 6A: Orifices

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)
OR1	_CourtStWetlandArea	_CourtStPond_Outlet		BOTTOM	RECT_CLOSED	4	2	3	0.65	NO	0	NO	0.09
OR10	DMH3	J250	2D	BOTTOM	RECT_CLOSED	2	2	17.003	0.65	NO	0	NO	0
OR108	CB104	J445		BOTTOM	RECT_CLOSED	2	2	4.439	0.65	NO	0	NO	4.72
OR109	MH1	J575	2D	BOTTOM	RECT_CLOSED	2	2	6.412	0.65	NO	0	NO	0
OR11	DMH-30	J1442	2D	BOTTOM	RECT_CLOSED	2	2	1.956	0.65	NO	0	NO	0.9
OR110	MH10	J1615	2D	BOTTOM	RECT_CLOSED	2	2	1.8	0.65	NO	0	NO	0
OR111	MH11	J1587	2D	BOTTOM	RECT_CLOSED	2	2	3.188	0.65	NO	0	NO	1.64
OR112	MH12	J1559	2D	BOTTOM	RECT_CLOSED	2	2	3.292	0.65	NO	0	NO	0
OR113	MH13	J1431	2D	BOTTOM	RECT_CLOSED	2	2	4.834	0.65	NO	0	NO	0
OR114	MH14	J1296	2D	BOTTOM	RECT_CLOSED	2	2	4.203	0.65	NO	0	NO	0
OR115	MH15	J1663	2D	BOTTOM	RECT_CLOSED	2	2	5.512	0.65	NO	0	NO	0

Table 6A: Orifices (continued...)

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)
OR116	MH16	J1674	2D	BOTTOM	RECT_CLOSED	2	2	5.218	0.65	NO	0	NO	0
OR117	MH17	J1690	2D	BOTTOM	RECT_CLOSED	2	2	4.344	0.65	NO	0	NO	0
OR118	MH18	J1606	2D	BOTTOM	RECT_CLOSED	2	2	3.794	0.65	NO	0	NO	0.68
OR119	MH2	J618	2D	BOTTOM	RECT_CLOSED	2	2	6.377	0.65	NO	0	NO	0
OR12	DMH-31	J1538	2D	BOTTOM	RECT_CLOSED	2	2	3.955	0.65	NO	0	NO	0
OR120	MH3	J662	2D	BOTTOM	RECT_CLOSED	2	2	5.989	0.65	NO	0	NO	0
OR121	MH4	J740	2D	BOTTOM	RECT_CLOSED	2	2	4.179	0.65	NO	0	NO	1.7
OR122	MH8	J1625	2D	BOTTOM	RECT_CLOSED	2	2	2.371	0.65	NO	0	NO	0.01
OR123	MH9	J1621	2D	BOTTOM	RECT_CLOSED	2	2	2.03	0.65	NO	0	NO	0.01
OR126	StillingBasin	J894	2D	BOTTOM	RECT_CLOSED	2	2	4.3	0.65	NO	0	NO	0
OR128	Rt6Drywells	J408	2D	BOTTOM	RECT_CLOSED	2	2	6.643	0.65	NO	0	NO	0
OR13	DMH-32	J1551	2D	BOTTOM	RECT_CLOSED	2	2	2.725	0.65	NO	0	NO	0.15
OR131	CB112	J564		BOTTOM	RECT_CLOSED	2	2	3.838	0.65	NO	0	NO	0.69
OR14	DMH-12	J907	2D	BOTTOM	RECT_CLOSED	2	2	5.627	0.65	NO	0	NO	0
OR15	DMH-16	J1159	2D	BOTTOM	RECT_CLOSED	2	2	5.458	0.65	NO	0	NO	0
OR16	DMH-15	J1118	2D	BOTTOM	RECT_CLOSED	2	2	6.737	0.65	NO	0	NO	0
OR17	DMH-17	J1120	2D	BOTTOM	RECT_CLOSED	2	2	6.146	0.65	NO	0	NO	0
OR18	DMH-18	J1058	2D	BOTTOM	RECT_CLOSED	2	2	8.472	0.65	NO	0	NO	0
OR19	DMH-13	J976	2D	BOTTOM	RECT_CLOSED	2	2	7.628	0.65	NO	0	NO	0
OR2	CB4	J1145	2D	BOTTOM	RECT_CLOSED	2	2	8.172	0.65	NO	0	NO	10.79
OR20	DMH-14	J1034	2D	BOTTOM	RECT_CLOSED	2	2	8.571	0.65	NO	0	NO	0
OR21	DMH-13	J978		BOTTOM	RECT_CLOSED	2	2	7.627	0.65	NO	0	NO	0
OR22	SC-1	J401	2D	BOTTOM	RECT_CLOSED	2	2	2.572	0.65	NO	0	NO	0.22
OR23	DMH-28	J1379		BOTTOM	RECT_CLOSED	2	2	1.591	0.65	NO	0	NO	0.93
OR3	CB6	J1164	2D	BOTTOM	RECT_CLOSED	2	2	8.01	0.65	NO	0	NO	3.78
OR4	DMH2	J1142	2D	BOTTOM	RECT_CLOSED	2	2	9.921	0.65	NO	0	NO	0

Table 6A: Orifices (continued...)

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)
OR45	CB105	J66		BOTTOM	RECT_CLOSED	2	2	2.054	0.65	NO	0	NO	6.53
OR5	DMH-28	J1402		BOTTOM	RECT_CLOSED	2	2	1.361	0.65	NO	0	NO	1.18
OR6	DMH-25	J1263	2D	BOTTOM	RECT_CLOSED	2	2	2.722	0.65	NO	0	NO	0
OR66	CB1	J575	2D	BOTTOM	RECT_CLOSED	2	2	5.75	0.65	NO	0	NO	0
OR67	CB10	J69	2D	BOTTOM	RECT_CLOSED	2	2	5.016	0.65	NO	0	NO	0
OR68	CB101	J693	2D	BOTTOM	RECT_CLOSED	2	2	5.6	0.65	NO	0	NO	0
OR69	CB2	J576	2D	BOTTOM	RECT_CLOSED	2	2	5.05	0.65	NO	0	NO	0
OR7	DMH-26	J1285	2D	BOTTOM	RECT_CLOSED	2	2	2.485	0.65	NO	0	NO	0
OR71	CB27	J1620	2D	BOTTOM	RECT_CLOSED	2	2	2.73	0.65	NO	0	NO	0.06
OR72	CB28	J1600	2D	BOTTOM	RECT_CLOSED	2	2	3.75	0.65	NO	0	NO	0
OR73	CB29	J1630	2D	BOTTOM	RECT_CLOSED	2	2	2.943	0.65	NO	0	NO	4.3
OR74	CB3	J595	2D	BOTTOM	RECT_CLOSED	2	2	5.1	0.65	NO	0	NO	0
OR75	CB30	J1634	2D	BOTTOM	RECT_CLOSED	2	2	3.817	0.65	NO	0	NO	0
OR76	CB31	J1578	2D	BOTTOM	RECT_CLOSED	2	2	2.85	0.65	NO	0	NO	0
OR77	CB32	J1571	2D	BOTTOM	RECT_CLOSED	2	2	5.35	0.65	NO	0	NO	0
OR78	CB33	J1607	2D	BOTTOM	RECT_CLOSED	2	2	3.5	0.65	NO	0	NO	15.13
OR8	DMH-27	J1333	2D	BOTTOM	RECT_CLOSED	2	2	2.325	0.65	NO	0	NO	2.48
OR81	DMH-03	J85	2D	BOTTOM	RECT_CLOSED	2	2	4.94	0.65	NO	0	NO	0
OR82	DMH-06	J691	2D	BOTTOM	RECT_CLOSED	2	2	4.27	0.65	NO	0	NO	0
OR83	DMH-07	J764	2D	BOTTOM	RECT_CLOSED	2	2	6.9	0.65	NO	0	NO	0
OR84	DMH-08	J798	2D	BOTTOM	RECT_CLOSED	2	2	6.707	0.65	NO	0	NO	0
OR85	DMH-09	J817	2D	BOTTOM	RECT_CLOSED	2	2	7.74	0.65	NO	0	NO	0
OR87	DMH-10	J853	2D	BOTTOM	RECT_CLOSED	2	2	8.47	0.65	NO	0	NO	0
OR9	DMH-28	J1423	2D	BOTTOM	RECT_CLOSED	2	2	1.634	0.65	NO	0	NO	2.56
OR93	J30	J828	2D	BOTTOM	RECT_CLOSED	2	2	4.5	0.65	NO	0	NO	0
OR94	J31	J813	2D	BOTTOM	RECT_CLOSED	2	2	4.3	0.65	NO	0	NO	0

Table 6A: Orifices (continued...)

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)
OR96	J34	J660	2D	BOTTOM	RECT_CLOSED	2	2	6.19	0.67	NO	0	NO	0

Table 6B: Orifices

Name	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
OR1	10/31/2018 12:09 PM	0	0	0	0	19.804	0	1
OR10	10/31/2018 00:00 AM	0	0	0	0	8.305	0	1
OR108	10/31/2018 12:10 PM	0	0	0	0	3.422	0	1
OR109	10/31/2018 00:00 AM	0	0	0	0	2.749	0	1
OR11	10/31/2018 12:04 PM	0	0	0	0	2.487	0	1
OR110	10/31/2018 00:00 AM	0	0	0	0	2.401	0	1
OR111	10/31/2018 12:05 PM	0	0	0	0	4.55	0	1
OR112	10/31/2018 00:00 AM	0	0	0	0	0.71	0	1
OR113	10/31/2018 00:00 AM	0	0	0	0	2.731	0	1
OR114	10/31/2018 00:00 AM	0	0	0	0	4.144	0	1
OR115	10/31/2018 00:00 AM	0	0	0	0	4.398	0	1
OR116	10/31/2018 00:00 AM	0	0	0	0	3.729	0	1
OR117	10/31/2018 00:00 AM	0	0	0	0	4.084	0	1
OR118	10/31/2018 12:05 PM	0	0	0	0	4.132	0	1
OR119	10/31/2018 00:00 AM	0	0	0	0	5.192	0	1
OR12	10/31/2018 12:08 PM	0	0	0	0	1.035	0	1
OR120	10/31/2018 00:00 AM	0	0	0	0	4.372	0	1
OR121	10/31/2018 12:10 PM	0	0	0	0	2.802	0	1
OR122	10/31/2018 12:05 PM	0	0	0	0	2.242	0	1

FINAL

Table 6B: Orifices (continued...)

Name	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OR123	10/31/2018 12:05 PM	0	0	0	0	2.105	0	1
OR126	10/31/2018 00:00 AM	0	0	0	0	71.342	0	1
OR128	10/31/2018 00:00 AM	0	0	0	0	4.358	0	1
OR13	10/31/2018 12:07 PM	0	0	0	0	3.741	0	1
OR131	10/31/2018 12:04 PM	0	0	0	0	3.186	0	1
OR14	10/31/2018 00:00 AM	0	0	0	0	2.195	0	1
OR15	10/31/2018 00:00 AM	0	0	0	0	3.004	0	1
OR16	10/31/2018 00:00 AM	0	0	0	0	3.423	0	1
OR17	10/31/2018 00:00 AM	0	0	0	0	3.11	0	1
OR18	10/31/2018 00:00 AM	0	0	0	0	1.565	0	1
OR19	10/31/2018 00:00 AM	0	0	0	0	3.869	0	1
OR2	10/31/2018 12:06 PM	0	0	0	0	4.695	0	1
OR20	10/31/2018 00:00 AM	0	0	0	0	1.322	0	1
OR21	10/31/2018 00:00 AM	0	0	0	0	11.146	0	1
OR22	10/31/2018 12:06 PM	0	0	0	0	2.527	0	1
OR23	10/31/2018 12:00 PM	0	0	0	0	25.907	0	1
OR3	10/31/2018 12:05 PM	0	0	0	0	5.656	0	1
OR4	10/31/2018 00:00 AM	0	0	0	0	2.875	0	1
OR45	10/31/2018 12:20 PM	0	0	0	0	3.694	0	1
OR5	10/31/2018 11:58 AM	0	0	0	0	13.284	0	1
OR6	10/31/2018 00:00 AM	0	0	0	0	1.414	0	1
OR66	10/31/2018 00:00 AM	0	0	0	0	4.178	0	1
OR67	10/31/2018 00:00 AM	0	0	0	0	6.514	0	1
OR68	10/31/2018 00:00 AM	0	0	0	0	2.289	0	1
OR69	10/31/2018 00:00 AM	0	0	0	0	3.343	0	1
OR7	10/31/2018 00:00 AM	0	0	0	0	2.78	0	1

DRAFT

Table 6B: Orifices (continued...)

Name	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OR71	10/31/2018 12:05 PM	0	0	0	0	2.278	0	1
OR72	10/31/2018 00:00 AM	0	0	0	0	4.607	0	1
OR73	10/31/2018 12:05 PM	0	0	0	0	4.092	0	1
OR74	10/31/2018 00:00 AM	0	0	0	0	1.644	0	1
OR75	10/31/2018 00:00 AM	0	0	0	0	4.383	0	1
OR76	10/31/2018 00:00 AM	0	0	0	0	0.644	0	1
OR77	10/31/2018 00:00 AM	0	0	0	0	3.631	0	1
OR78	10/31/2018 12:05 PM	0	0	0	0	0.716	0	1
OR8	10/31/2018 12:05 PM	0	0	0	0	2.546	0	1
OR81	10/31/2018 00:00 AM	0	0	0	0	3.007	0	1
OR82	10/31/2018 00:00 AM	0	0	0	0	2.23	0	1
OR83	10/31/2018 00:00 AM	0	0	0	0	1.995	0	1
OR84	10/31/2018 00:00 AM	0	0	0	0	3.977	0	1
OR85	10/31/2018 00:00 AM	0	0	0	0	4.269	0	1
OR87	10/31/2018 00:00 AM	0	0	0	0	3.179	0	1
OR9	10/31/2018 12:07 PM	0	0	0	0	2.654	0	1
OR93	10/31/2018 00:00 AM	0	0	0	0	1.949	0	1
OR94	10/31/2018 00:00 AM	0	0	0	0	3.572	0	1
OR96	10/31/2018 00:00 AM	0	0	0	0	7.446	0	1

LEVEL

Table 7A: Outfalls

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Tide Gate	Route To	Type	Fixed Stage (ft)	Curve Name	Series Name	Outlet	Baseline (cfs)	Baseline Pattern
OF-RS-10-S	1008709.714	2846286.735	Zone1	NO	NO	23.64	23.64	NO		FREE	0	*	*		0	
OF-RS-11-N	1008997.279	2846761.397	Zone1	NO	NO	18.64	18.64	NO		FREE	0	*	*		0	
OF-RS-12-N	1009705.646	2847331.275	Zone1	NO	NO	4.5	4.5	NO		FREE	0	*	*		0	
OF-RS-13-S	1010007.673	2847359.157	Zone1	NO	NO	4.12	4.12	NO		FREE	0	*	*		0	
OF-RS-1-N	1005291.471	2844369.017		NO	NO	12.17	12.17	NO		FREE	0	*	*		0	
OF-RS-2-N	1005381.777	2844473.665		NO	NO	7.26	7.26	NO		FREE	0	*	*		0	
OF-RS-3-N	1005823.967	2844899.856		NO	NO	19.37	19.37	NO		FREE	0	*	*		0	
OF-RS-4-S	1006279.282	2844959.564		NO	NO	11.15	11.15	NO		FREE	0	*	*		0	
OF-RS-5-S	1006567.492	2845149.66		NO	NO	10.22	10.22	NO		FREE	0	*	*		0	
OF-RS-6-N	1006807.849	2845520.893	Zone1	NO	NO	25.67	25.67	NO		FREE	0	*	*		0	
OF-RS-7-S	1007261.284	2845510.96	Zone1	NO	NO	25.15	25.15	NO		FREE	0	*	*		0	
OF-RS-8-N	1007630.539	2845893.742	Zone1	NO	NO	30.08	30.08	NO		FREE	0	*	*		0	
OF-RS-9-N	1007998.589	2846072.311	Zone1	NO	NO	33.13	33.13	NO		FREE	0	*	*		0	

Table 7B: Outfalls

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-10-S		1	0						0	0.01	0.19	23.83	10/31/2018 12:05 PM	0.19
OF-RS-11-N		1	0						0	0.03	0.39	19.03	10/31/2018 12:10 PM	0.39
OF-RS-12-N		1	0						0	0.06	1	5.5	10/31/2018 12:02 PM	1
OF-RS-13-S		1	0						0	0.07	1	5.12	10/31/2018 12:04 PM	1
OF-RS-1-N		1	0						0	0.02	0.29	12.46	10/31/2018 12:05 PM	0.29
OF-RS-2-N		1	0						0	0.04	0.55	7.81	10/31/2018 12:05 PM	0.54
OF-RS-3-N		1	0						0	0.05	0.67	20.04	10/31/2018 12:05 PM	0.67

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Table 7B: Outfalls (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-4-S		1	0						0	0.02	0.28	11.43	10/31/2018 12:10 PM	0.28
OF-RS-5-S		1	0						0	0.02	0.24	10.46	10/31/2018 12:05 PM	0.24
OF-RS-6-N		1	0						0	0.03	0.37	26.04	10/31/2018 12:05 PM	0.37
OF-RS-7-S		1	0						0	0.04	0.44	25.59	10/31/2018 12:20 PM	0.44
OF-RS-8-N		1	0						0	0.02	0.23	30.31	10/31/2018 12:05 PM	0.23
OF-RS-9-N		1	0						0	0.01	0.18	33.31	10/31/2018 12:05 PM	0.18

Table 7C: Outfalls

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-10-S	0	0.88	0	0.024	0	0	0	0	0	0	0	0	30.57	0.06	0.88	0.024
OF-RS-11-N	0	2.43	0	0.086	0	0	0	0	0	0	0	0	29.13	0.23	2.43	0.086
OF-RS-12-N	0	8.74	0	0.294	0	0	0	0	0	0	0	0	32	0.72	8.74	0.294
OF-RS-13-S	16.71	22.9	0.485	0.674	0	0	0	0	0	0	0	0	41.3	1.28	22.9	0.674
OF-RS-1-N	0	1.13	0	0.032	0	0	0	0	0	0	0	0	36.9	0.07	1.13	0.031
OF-RS-2-N	0	4.05	0	0.118	0	0	0	0	0	0	0	0	45.86	0.2	4.05	0.118
OF-RS-3-N	0	4.14	0	0.114	0	0	0	0	0	0	0	0	34.33	0.26	4.14	0.114
OF-RS-4-S	0	2.4	0	0.086	0	0	0	0	0	0	0	0	30.59	0.22	2.4	0.085
OF-RS-5-S	0	1.96	0	0.054	0	0	0	0	0	0	0	0	34.58	0.12	1.96	0.054
OF-RS-6-N	0	1.58	0	0.045	0	0	0	0	0	0	0	0	33.12	0.11	1.58	0.045
OF-RS-7-S	0	3.38	0	0.146	0	0	0	0	0	0	0	0	32.23	0.35	3.38	0.146
OF-RS-8-N	0	0.88	0	0.026	0	0	0	0	0	0	0	0	42.47	0.05	0.88	0.026
OF-RS-9-N	0	0.46	0.001	0.014	0	0	0	0	0	0	0	0	38.87	0.03	0.46	0.014

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Table 7D: Outfalls

Name	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OF-RS-10-S	0	0	0	0	0	1
OF-RS-11-N	0	0	0	0	0	1
OF-RS-12-N	0	0	0	0	0	1
OF-RS-13-S	0	0	0	0	0	1
OF-RS-1-N	0	0	0	0	0	1
OF-RS-2-N	0	0	0	0	0	1
OF-RS-3-N	0	0	0	0	0	1
OF-RS-4-S	0	0	0	0	0	1
OF-RS-5-S	0	0	0	0	0	1
OF-RS-6-N	0	0	0	0	0	1
OF-RS-7-S	0	0	0	0	0	1
OF-RS-8-N	0	0	0	0	0	1
OF-RS-9-N	0	0	0	0	0	1

Table 8A: Weirs

Name	Inlet Node	Outlet Node	Tag	Type	Height (ft)	Length (ft)	Side Slope (ft/ft)	Inlet Offset (ft)	Discharge Coeff. (CFS)	Flap Gate	End Contractions	End Coeff. (CFS)
BasinOverflowWeir	_Rt6Basin&Forebay	_Rt6Basin_OF	Zone3	TRANSVERSE	2	120	0	4	3.33	NO	0	0
C19_1	DMH-32	DMH-32_Weir		TRANSVERSE	1	1	0	0.5	3.33	NO	0	0
W1	_Rt6Basin&Forebay	_Rt6Basin_OF		TRANSVERSE	2	17	0	3	3.33	NO	0	0

Level One

Table 8B: Weirs

Name	Can Surcharge	Coeff. Curve	Road Width (ft)	Road Surface	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
BasinOverflowWeir	YES		0	PAVED	NO	0	10/31/2018 00:00 AM	0	0	0	0
C19_1	YES		0	PAVED	NO	1.37	10/31/2018 12:14 PM	0.55	0	0	0
W1	YES		0	PAVED	NO	18.83	10/31/2018 12:07 PM	0.24	0	0	0

Table 8C: Weirs

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
BasinOverflowWeir	22.162	0	1
C19_1	3.586	0	1
W1	23.005	0	1

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PCSWMM Report

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Proposed

Model ShankPainter_PR_100yr24hr_2024.03.17.inp

Apex Companies, LLC

March 30, 2024

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Summary 1: Options

Name	ShankPainter_PR_100yr24hr_2024.03.17
Flow Units	CFS
Infiltration method	Curve Number
Flow routing method	Dynamic Wave
Link offsets defined by	Depth
Allow ponding	No
Skip steady flow periods	No
Inertial dampening	Full
Define supercritical flow by	Both
Force Main Equation	H-W
Variable time step	On
Adjustment factor (%)	75
Conduit lengthening (s)	0
Minimum surface area (ft²)	0.1
Starting date	Oct-31-2018 12:00:00 AM
Ending date	Nov-2-2018 12:00:00 AM
Duration of simulation (hours)	48
Antecedent dry days (days)	0
Rain interval (h:mm)	0:06
Report time step (h:mm:ss)	00:01:00
Wet time step (h:mm:ss)	00:05:00
Dry time step (h:mm:ss)	00:05:00
Routing time step (s)	0.5
Minimum time step used (s)	0.07
Average time step used (s)	0.5
Minimum conduit slope	0
Ignore rainfall/runoff	No
Ignore snow melt	No
Ignore groundwater	No
Ignore flow routing	No
Ignore water quality	No
Report average results	No

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Summary 2: Model inventory

Name	ShankPainter_PR_100yr24hr_2024.03.17
Raingages	3
Subcatchments	0
Aquifers	0
Snowpacks	0
RDII hydrographs	0
Junction nodes	1966
Outfall nodes	351
Flow divider nodes	0
Storage unit nodes	8
Conduit links	5488
Pump links	2
Orifice links	64
Weir links	3
Outlet links	0
Treatment units	0
Transects	1
Control rules	0
Pollutants	0
Land Uses	0
Control Curves	0
Diversion Curves	0
Pump Curves	3
Rating Curves	0
Shape Curves	0
Storage Curves	17
Tidal Curves	0
Weir Curves	0
Time Series	4
Time Patterns	0

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Summary 3: Model complexity

Name	ShankPainter_PR_100yr24hr_2024.03.17
Subcatchments	n/a
Groundwater	n/a
Aquifers	n/a
Snowpacks	n/a
RDII hydrographs	n/a
Junction nodes	4017
Outfall nodes	351
Flow divider nodes	n/a
Storage unit nodes	36
Conduit links	32838
Pump links	4
Orifice links	256
Weir links	12
Outlet links	n/a
Transect	3
Pollutants	n/a
Land Uses	n/a
Model complexity (total uncertain input parameters)	37517

Summary 4: Node statistics

Name	ShankPainter_PR_100yr24hr_2024.03.17
Max. ground elev. (ft)	81.527
Min. ground elev. (ft)	4.5
Max. invert elev. (ft)	52.558
Min. invert elev. (ft)	-13
Max. depth (ft)	30
Min. depth (ft)	0

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Summary 5: Conduit statistics

Name	ShankPainter_PR_100yr24hr_2024.03.17
Max. roughness	0.4
Min. roughness	0.01
Max. entry loss coef.	0.5
Min. entry loss coef.	0
Max. exit loss coef.	0
Min. exit loss coef.	0
Max. avg. loss coef.	0.5
Min. avg. loss coef.	0
Max. length (ft)	482.605
Min. length (ft)	5.84
Total length (ft)	131014.678
Max. slope (ft/ft)	2.0301
Min. slope (ft/ft)	-0.6074

Summary 6: Conduit Inventory

Name	ShankPainter_PR_100yr24hr_2024.03.17
Open Rectangular (ft)	121870.74
Circular (ft)	9143.938

Summary 7: Pipe inventory

Name	ShankPainter_PR_100yr24hr_2024.03.17
Max. pipe diameter (ft)	2
Min. pipe diameter (ft)	0.833
Total 12” pipe length (ft)	5385.936
Total 15” pipe length (ft)	1553.518
Total 18” pipe length (ft)	1235.844
Total 24” pipe length (ft)	756.63
Total other pipe length (ft)	212.01
Total pipe length (ft)	9143.938

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Summary 8: Flow routing continuity

Name	ShankPainter_PR_100yr24hr_2024.03.17
Dry weather inflow (MG)	0.000
Wet weather inflow (MG)	0.000
Groundwater inflow (MG)	0.000
RDII inflow (MG)	0.000
External inflow (MG)	14.436
External outflow (MG)	3.446
Flooding loss (MG)	4.852
Evaporation loss (MG)	0.000
Exfiltration loss (MG)	0.392
Initial stored volume (MG)	0.002
Final stored volume (MG)	5.751
Continuity error (%)	-0.016

Summary 9: Results statistics

Name	ShankPainter_PR_100yr24hr_2024.03.17
Max. subcatchment total runoff (MG)	n/a
Max. subcatchment peak runoff (cfs)	n/a
Max. subcatchment runoff coefficient	n/a
Max. subcatchment total precip (in)	n/a
Min. subcatchment total precip (in)	n/a
Max. node depth (ft)	55
Num. nodes surcharged	16
Max. node surcharge duration (hours)	8.48
Max. node height above crown (ft)	54
Min. node depth below rim (ft)	-1.9
Num. nodes flooded	4
Max. node flooding duration (hours)	48
Max. node flood volume (MG)	3.618
Max. node ponded volume or depth (acre-in/1000 ft³/ft)	50
Max. storage volume (1000 ft³)	321.036
Max. storage percent full (%)	100
Max. outfall flow frequency (%)	79.8
Max. outfall peak flow (cfs)	40.91
Max. outfall total volume (MG)	1.36
Total outfall volume (MG)	6.532
Max. link peak flow (cfs)	50.59
Max. link peak velocity (ft/s)	30.21
Min. link peak velocity (ft/s)	0

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Summary 9: Results statistics (continued...)

Name	ShankPainter_PR_100yr24hr_2024.03.17
Num. conduits surcharged	75
Max. conduit surcharge duration (hours)	46.11
Max. conduit capacity limited duration (hours)	4.16

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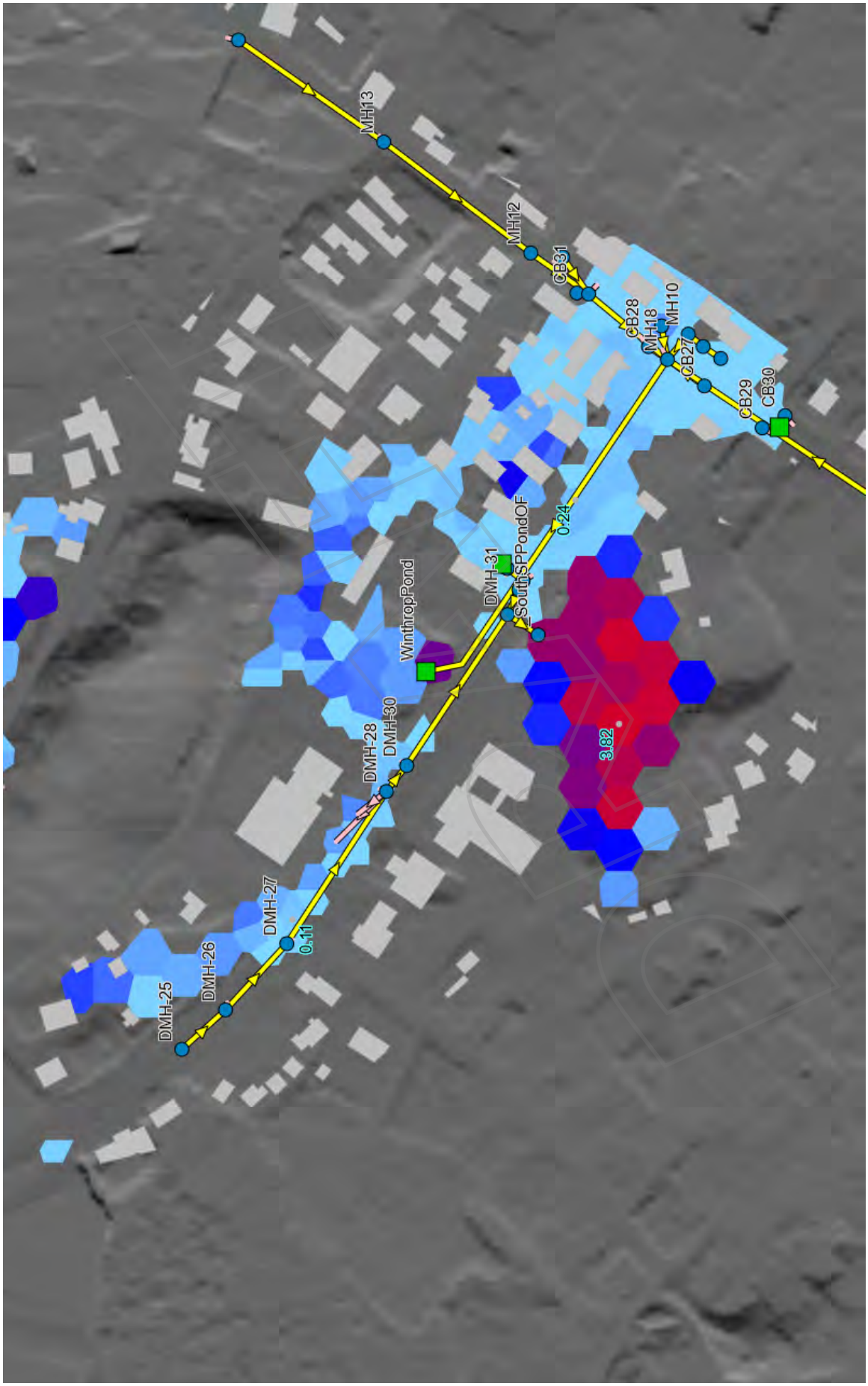


Figure 1: South Shank Painter

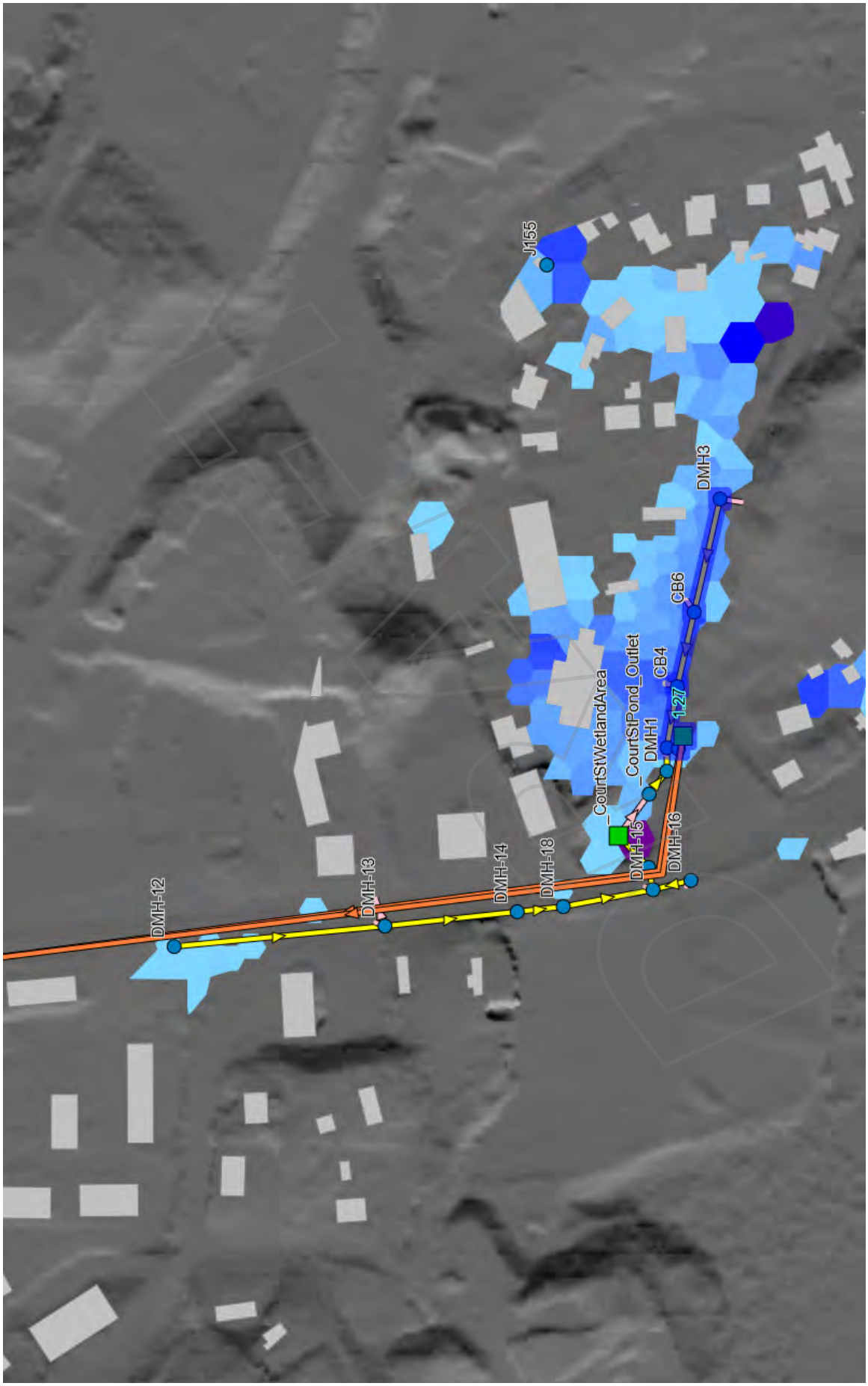


Figure 2: Court Street

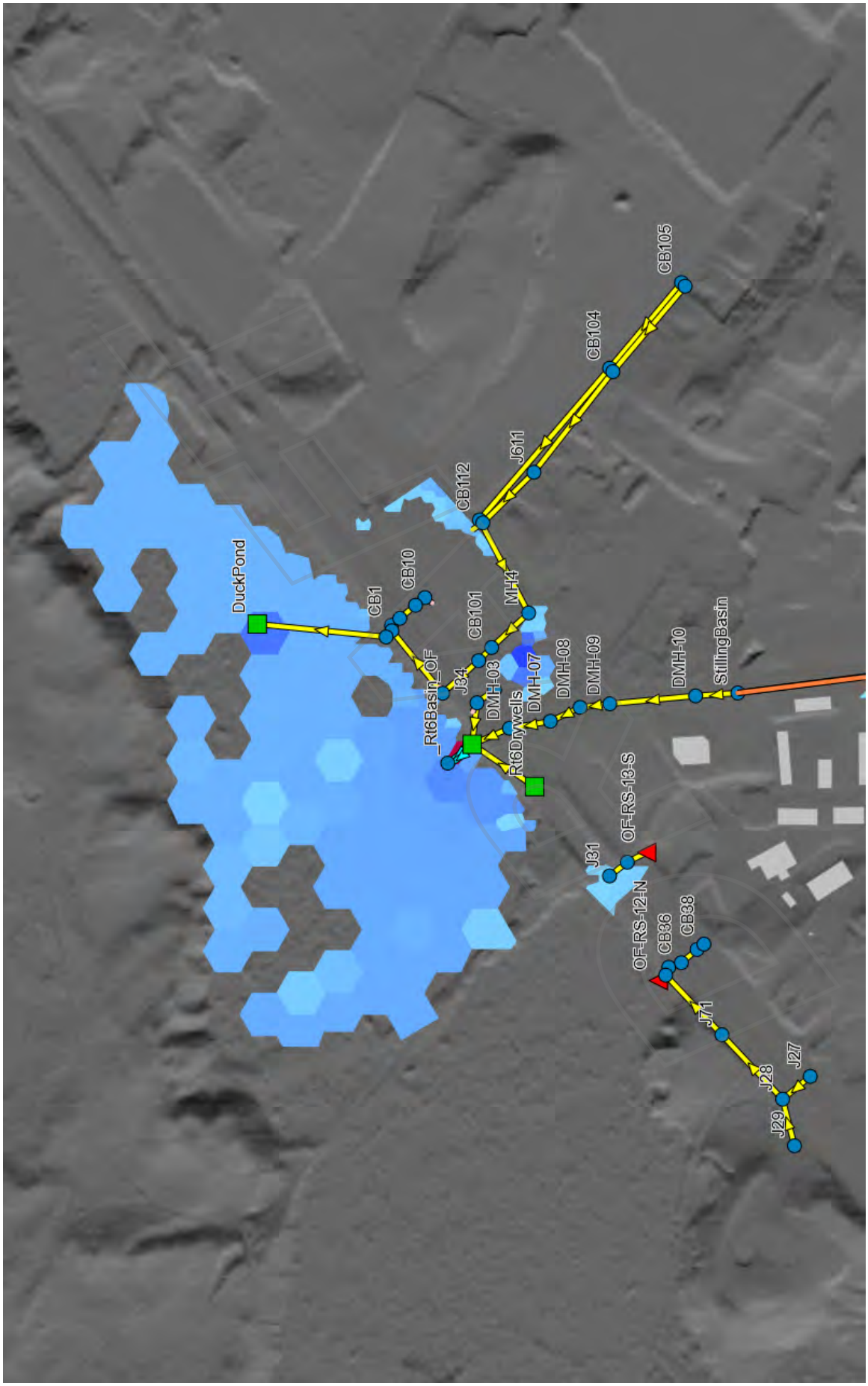


Figure 3: Duck Pond, Route 6-Shank Painter Intersection

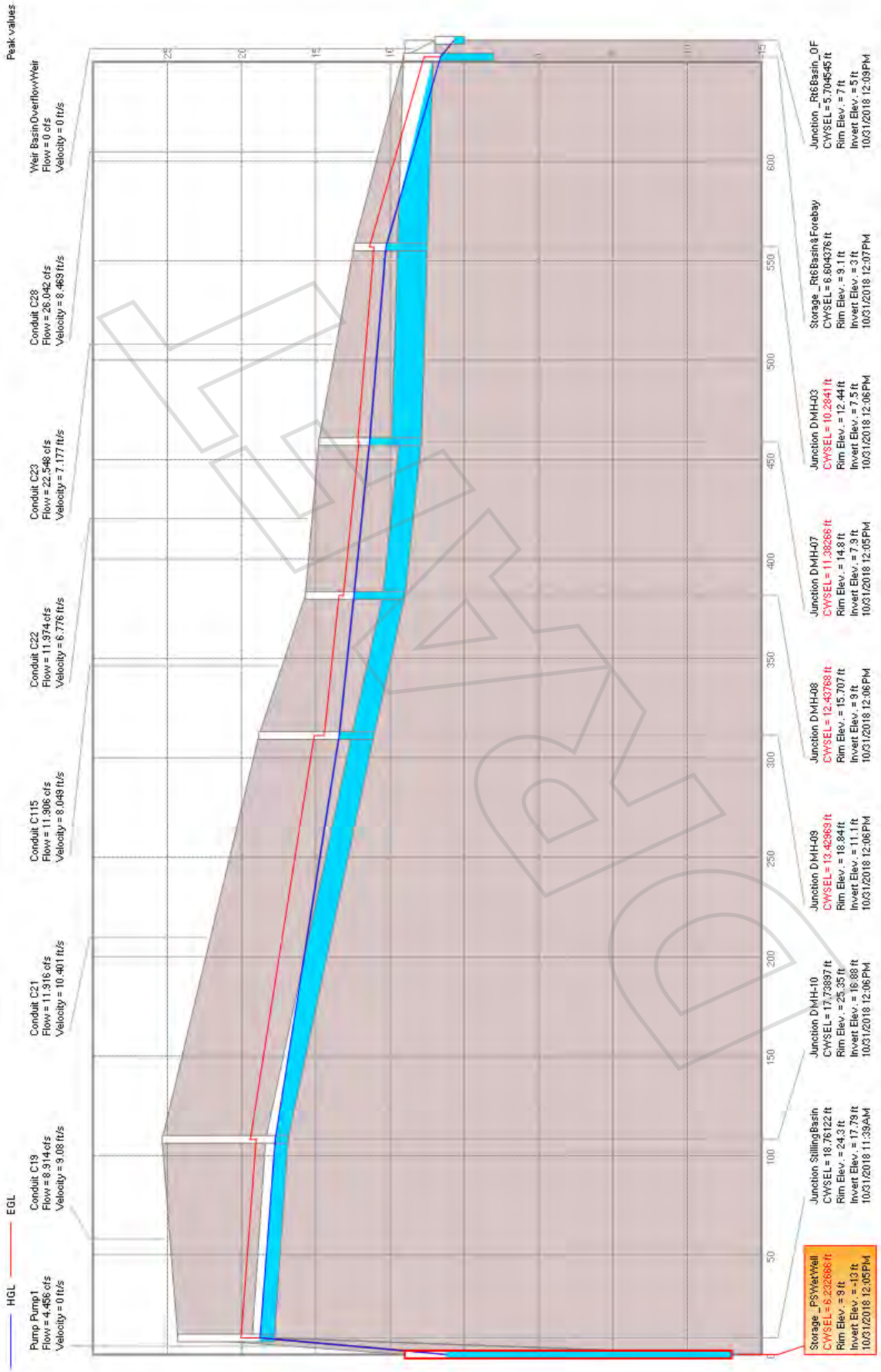


Figure 4: PS to North Outfall

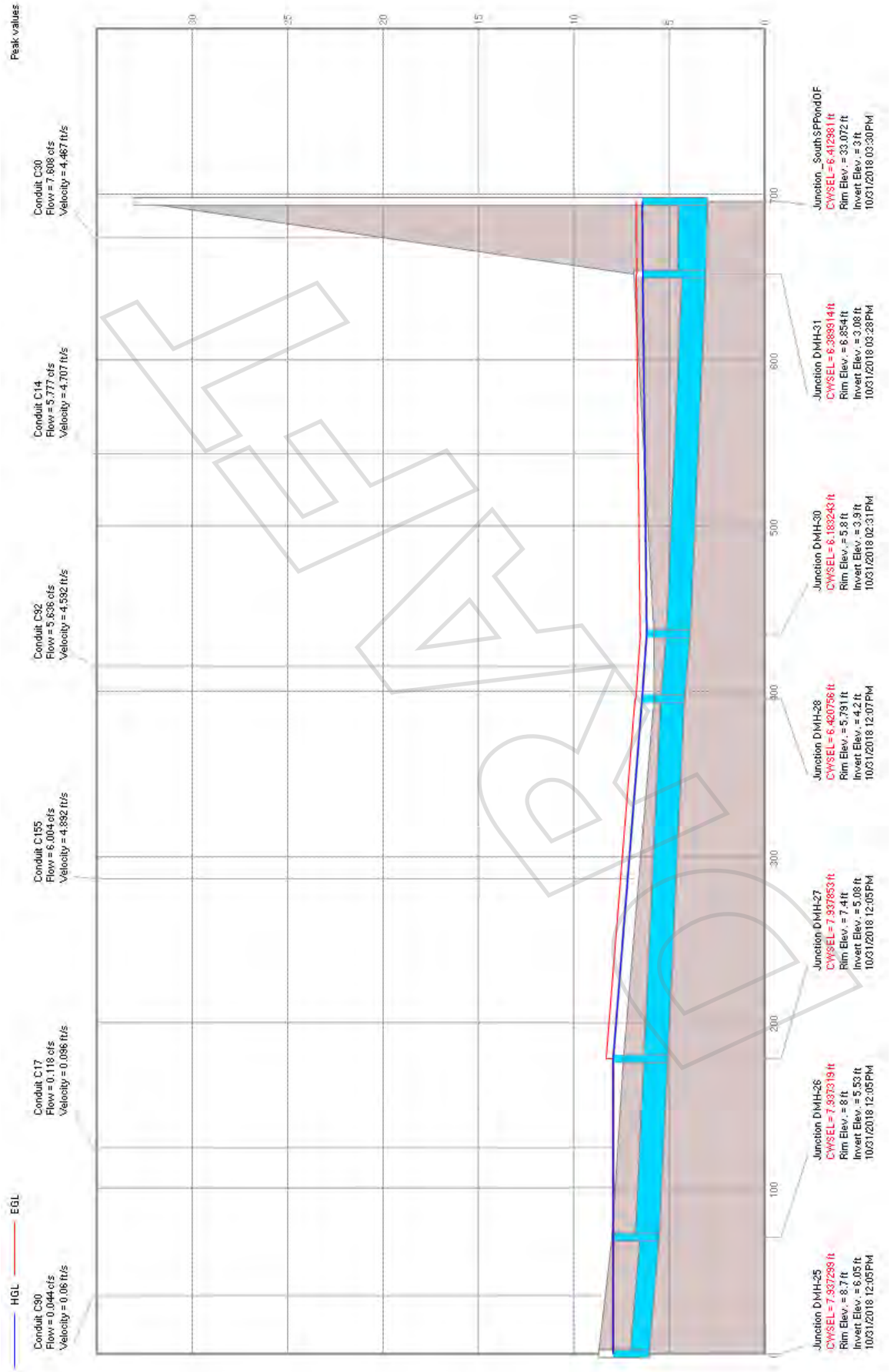


Figure 5: South Shank Painter

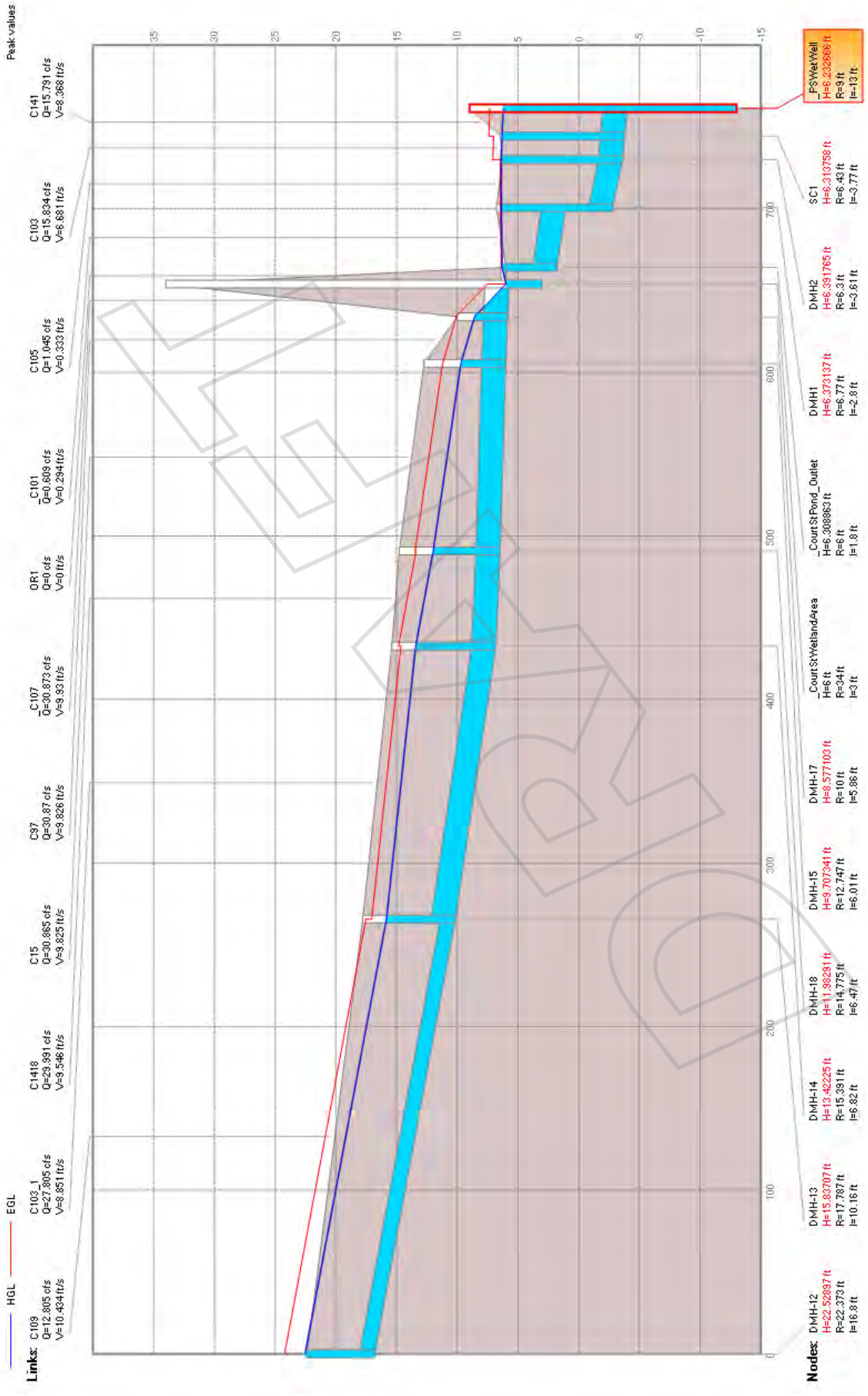


Figure 6: Shank Painter to Court St PS

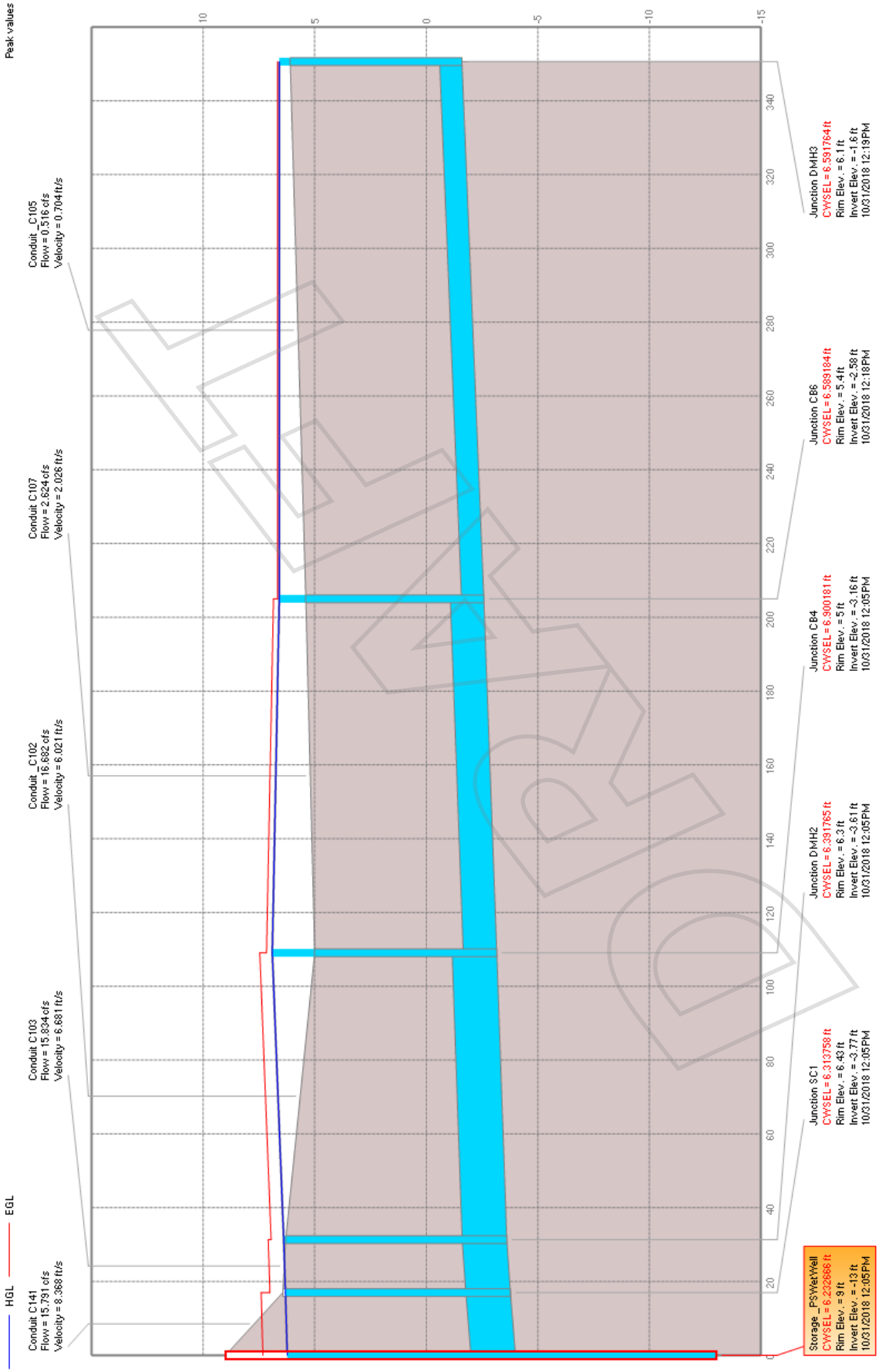


Figure 7: Court Street

Table 1A: Storages

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Evap. Factor (fraction)
_CourtStWetlandArea	1010552.018	2846243.243	Zone4	NO	NO	3	6	3	0	0	0	0
_PSWetWell	1010677.209	2846162.22		NO	NO	-13	9	22	0	0	0	0
_Rt6Basin&Forebay	1010262.67	2847770.047	Connect2D_Direct	NO	NO	3	8	5	0	0	0	0
DuckPond	1010546.203	2848276.711	Connect2D_Direct	NO	NO	4	5	1	0	0	0	0
DW#9	1011400.39	2845161.145		NO	NO	8.15	15.65	7.5	0	0	0	0
Rt6Drywells	1010162.878	2847622.97	Connect2D_Storage	NO	NO	4.07	10.7	6.63	0	0	0	0
SU1	1011236.875	2845492.701		NO	NO	3.84	7.93	4.09	0	0	0	0
WinthropPond	1011108.39	2845583.168	Zone6	NO	NO	1.5	4.5	3	0	0	0	0

Table 1B: Storages

Name	Storage Curve	Coefficient	Exponent	Constant (ft²)	Curve Name	Major Length (ft)	Minor Length (ft)	Side Slope	Height (ft)	Baseline (cfs)	Baseline Pattern	Time Series
_CourtStWetlandArea	TABULAR	1000	0	0	CourtStPond	0	0	0	0	0		
_PSWetWell	TABULAR	1000	0	0	PSWetWell	0	0	0	0	0		
_Rt6Basin&Forebay	TABULAR	1000	0	0	RetentionBasin&Forebay	0	0	0	0	0		
DuckPond	TABULAR	1000	0	0	DuckPond5ft	0	0	0	0	0		
DW#9	TABULAR	1000	0	0	Drywell_typ	0	0	0	0	0		
Rt6Drywells	TABULAR	1000	0	0	Rt6Drywells	0	0	0	0	0		
SU1	TABULAR	1000	0	0	Cultec150XLHD	0	0	0	0	0		
WinthropPond	TABULAR	1000	0	0	WinthropPond	0	0	0	0	0		

Table 1C: Storages

Name	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (fraction)	Avg. Depth (ft)	Max. Depth (ft)
_CourtStWetlandArea	1	0						0	0	0	0	2.46	3
_PSWetWell	1	0						0	0	0	0	2.99	19.24
_Rt6Basin&Forebay	1	0						0	1.93	4.74	0.413	1.23	3.6
DuckPond	1	0						0	0	0	0	0.65	0.92
DW#9	1	0						0	0	0	0	6.31	7.18
Rt6Drywells	1	0						0	1.93	4.74	0.413	1.18	4.06
SU1	1	0						0	1.93	4.74	0.413	0.61	2.55
WinthropPond	1	0						0	0	0	0	2.42	3

Table 1D: Storages

Name	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)
_CourtStWetlandArea	6	10/31/2018 10:44 AM	3	0.82	38.64	0.024	1.36	1.965	0	0	28	36.89	38.64
_PSWetWell	6.24	10/31/2018 12:05 PM	19.23	0	16.27	0	1.26	0.018	0	0	2.76	48	0
_Rt6Basin&Forebay	6.6	10/31/2018 12:06 PM	3.6	0	27.52	0	1.79	0	0	0	2.5	0	0
DuckPond	4.92	11/01/2018 14:14 PM	0.92	39.37	47.86	1.39	2.4	0.005	0	0	0.58	0	0
DW#9	15.33	10/31/2018 12:05 PM	7.17	0	1.37	0	0.046	1.23	0	0	0.32	0	0
Rt6Drywells	8.13	10/31/2018 12:05 PM	4.06	1.52	1.52	0.043	0.043	-0.008	0	0	2.57	0	0
SU1	6.39	10/31/2018 15:31 PM	2.55	0	1.81	0	0.11	-0.007	0	0	1.54	0	0
WinthropPond	4.5	10/31/2018 11:35 AM	3	4.69	57.53	0.13	3.93	0.838	0	0	0	36.41	57.53

Table 1E: Storages

Name	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Avg. Volume (1000 ft³)	Avg. Percent Full (%)	Evaporation Loss (%)	Infiltration Loss (%)	Total Percent Loss (%)	Max. Volume (1000 ft³)	Max. Percent Full (%)	Max. Outflow (cfs)	Contributing Area (ac)	Contributing Imp. Area (ac)
_CourtStWetlandArea	1.233	0	10.598	82	0	0	0	13.004	100	0	0	0
_PSWetWell	0	-2.764	-114.722	0	0	0	0	0	0	8.91	0	0
_Rt6Basin&Forebay	0	0	2.47	15	0	15	15	8.719	55	27.24	0	0
DuckPond	0	0	221.59	60	0	0	0	321.036	87	0	0	0
DW#9	0	0	0.251	83	0	0	0	0.288	95	1.37	0	0
Rt6Drywells	0	0	0.23	16	0	42	42	0.829	59	1.46	0	0
SU1	0	0	0.892	17	0	100	100	3.732	71	0.47	0	0
WinthropPond	3.618	0	30.569	80	0	0	0	38	100	0	0	0

Table 1F: Storages

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_CourtStWetlandArea	0	0	0	1
_PSWetWell	0	0	0	1
_Rt6Basin&Forebay	0	0	0	1
DuckPond	0	0	0	1
DW#9	0	0	0	1
Rt6Drywells	0	0	0	1
SU1	0	0	0	1
WinthropPond	0	0	0	1

Table 2A: Pumps

Name	Inlet Node	Outlet Node	Tag	Pump Curve	Initial Status	Startup Depth (ft)	Shutoff Depth (ft)	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)	Max/Full Flow	Utilized (%)	Start-Ups (num)
Pump1	_PSWetWell	StillingBasin		Constant2000gpm	OFF	4	1	NO	4.46	10/31/2018 08:22 AM	1	15.38	92
Pump2	_PSWetWell	StillingBasin		Constant2000gpm	OFF	5	1	NO	4.46	10/31/2018 11:38 AM	1	6.48	1

Table 2B: Pumps

Name	Min. Flow (cfs)	Avg. Flow (cfs)	Total Vol. (MG)	Power Usage	Below Curve (%)	Above Curve (%)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
Pump1	0	4.46	0.886	63.81	0	0	0	0	0	344.956	0	1
Pump2	0	4.46	0.373	17.66	0	0	0	0	0	347.306	0	1

Table 3A: Junctions

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
_CourtStPond_Outlet	1010604.363	2846204.755	Connect2D_MH	NO	NO	1.8	6	4.2	0	30	0	0
_Rt6Basin_OF	1010218.269	2847827.623	Zone3	NO	NO	5	5	0	0	0	0	0
_SouthSPPondOF	1011152.274	2845449.417	Zone5	NO	NO	3	33	30	0	0	0	0
CB1	1010543.4	2847960.354	Connect2D_MH	NO	NO	5.58	11.33	5.75	0	30	0	0
CB10	1010608.483	2847881.463	Connect2D_MH	NO	NO	6.36	11.16	4.8	0	30	0	0
CB101	1010490.895	2847724.25	Connect2D_MH	NO	NO	6.58	12.18	5.6	0	30	0	0
CB104	1011149.472	2847446.085		NO	NO	11.53	15.969	4.439	0	50	0	0
CB105	1011351.247	2847276.782		NO	NO	17.62	19.674	2.054	0	50	0	0
CB112	1010791.703	2847752.789		NO	NO	8.98	12.818	3.838	0	50	0	0
CB2	1010559.723	2847940.655	Connect2D_MH	NO	NO	6.08	11.13	5.05	0	30	0	0
CB27	1011449.616	2845250.949	Connect2D_MH	NO	NO	8	10.039	2.039	0	30	0	0

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Proposal No. 608744-136412

Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
CB28	1011496.541	2845317.631	Connect2D_MH	NO	NO	5.5	9.25	3.75	0	30	0	0
CB29	1011399.511	2845181.95	Connect2D_MH	NO	NO	11.88	14.18	2.3	0	30	0	0
CB3	1010590.535	2847903.6	Connect2D_MH	NO	NO	6.13	11.23	5.1	0	30	0	0
CB30	1011414.192	2845154.644	Connect2D_MH	NO	NO	12.37	15.17	2.8	0	30	0	0
CB31	1011560.681	2845403.096	Connect2D_MH	NO	NO	8.85	11.7	2.85	0	30	0	0
CB32	1011603.491	2845420.161	Connect2D_MH	NO	NO	8.21	10.91	2.7	0	30	0	0
CB33	1011521.313	2845302.115	Connect2D_MH	NO	NO	5.55	9.05	3.5	0	30	0	0
CB35	1009736.842	2847306.934		NO	NO	6.76	12.09	5.33	0	50	0	0
CB36	1009747.672	2847276.924		NO	NO	7	12.09	5.09	0	50	0	0
CB37	1009778.85	2847240.103		NO	NO	7.23	12.04	4.81	0	50	0	0
CB38	1009791.611	2847223.915		NO	NO	7.85	12.04	4.19	0	50	0	0
CB4	1010739.258	2846169.508	Connect2D_MHs	NO	NO	-3.16	5	8.16	0	30	0	0
CB6	1010832.831	2846148.26	Connect2D_MHs	NO	NO	-2.58	5.4	7.98	0	30	0	0
DMH-03	1010300.442	2847682.232	Connect2D_MH	NO	NO	7.5	12.44	4.94	0	30	0	0
DMH-06	1010391.083	2847717.435	Connect2D_MH	NO	NO	9.1	13.37	4.27	0	30	0	0
DMH-07	1010317.02	2847585.758	Connect2D_MH	NO	NO	7.9	14.8	6.9	0	30	0	0
DMH-08	1010349.802	2847515.652	Connect2D_MH	NO	NO	9	15.707	6.707	0	30	0	0
DMH-09	1010358.138	2847445.696	Connect2D_MH	NO	NO	11.1	18.84	7.74	0	30	0	0
DMH1	1010633.219	2846182.484		NO	NO	-2.8	6.77	9.57	0	0	0	0
DMH-10	1010376.899	2847243.495	Connect2D_MH	NO	NO	16.88	25.35	8.47	0	30	0	0
DMH-12	1010413.132	2846800.679	Connect2D_SPCourt	NO	NO	16.8	22.373	5.573	0	30	0	0
DMH-13	1010438.795	2846536.234	Connect2D_SPCourt	NO	NO	10.16	17.456	7.296	0	30	0	0
DMH-14	1010456.768	2846370.239	Connect2D_SPCourt	NO	NO	6.82	15.391	8.571	0	30	0	0
DMH-15	1010484.409	2846199.833	Connect2D_SPCourt	NO	NO	6.01	12.747	6.737	0	30	0	0
DMH-16	1010496.227	2846152.386	Connect2D_SPCourt	NO	NO	6.4	11.736	5.336	0	30	0	0
DMH-17	1010512.398	2846205.536	Zone4	NO	NO	5.86	10	4.14	0	30	0	0

Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
DMH-18	1010463.221	2846312.494	Connect2D_SPCourt	NO	NO	6.47	14.775	8.305	0	30	0	0
DMH2	1010662.63	2846182.442	Connect2D_MHs	NO	NO	-3.61	6.3	9.91	0	30	0	0
DMH-25	1010657.414	2845874.873	Connect2D_MHs	NO	NO	6.05	8.7	2.65	0	30	0	0
DMH-26	1010704.509	2845822.687	Connect2D_MHs	NO	NO	5.53	8	2.47	0	30	0	0
DMH-27	1010783.602	2845749.536	Connect2D_MHs	NO	NO	5.08	7.4	2.32	0	30	0	0
DMH-28	1010965.439	2845630.575	Connect2D_MHs	NO	NO	4.2	5.56	1.36	0	30	0	0
DMH3	1010974.762	2846115.859	Connect2D_MHs	NO	NO	-1.6	6.1	7.7	0	30	0	0
DMH-30	1010996.302	2845606.408	Connect2D_MHs	NO	NO	3.9	5.8	1.9	0	30	0	0
DMH-31	1011176.719	2845485.848	Connect2D_MHs	NO	NO	3.08	6.854	3.774	0	30	0	0
DMH-32	1011217.088	2845467.438	Connect2D_MHs	NO	NO	4.48	6.93	2.45	0	30	0	0
DMH-32_Weir	1011206.384	2845472.32		NO	NO	4.416	6.91	2.494	0	0	0	0
J1	1006841.74	2845465.493		NO	NO	27.4	32.9	5.5	0	50	0	0
J10	1008672.424	2846345.08		NO	NO	31	36.6	5.6	0	50	0	0
J11	1005923.53	2844777.21		NO	NO	21	26.115	5.115	0	50	0	0
J1145	1010743.392	2846184.348	2D_label	NO	NO	5.012	35.012	30	0	0	0	0
J12	1005617.671	2844526.538		NO	NO	16.5	21.2	4.7	0	50	0	0
J13	1005898.8	2844802.636		NO	NO	20.7	25.178	4.478	0	50	0	0
J1334	1010812.392	2845742.688	2D_label	NO	NO	6.915	36.915	30	0	0	0	0
J14	1007660.717	2845841.779		NO	NO	33	38.2	5.2	0	50	0	0
J15	1007693.105	2845773.999		NO	NO	33.2	38.2	5	0	50	0	0
J155	1011268.42	2846333.211	Connect2D_Direct	NO	NO	7.185	7.185	0	0	0	0	0
J1574	1011313.392	2845404.948	2D_label	NO	NO	7.865	37.865	30	0	0	0	0
J16	1008017.631	2846022.698		NO	NO	35	40.6	5.6	0	50	0	0
J17	1008052.712	2845956.117		NO	NO	35.6	40.617	5.017	0	50	0	0
J18	1005326.069	2844318.463		NO	NO	13.74	17.97	4.23	0	50	0	0
J2	1009033.294	2846722.781		NO	NO	21.4	27.8	6.4	0	50	0	0

PRELIMINARY

Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
J20	1005571.622	2844576.409		NO	NO	16	21.2	5.2	0	50	0	0
J22	1005435.367	2844345.713		NO	NO	14.5	19	4.5	0	50	0	0
J23	1005396.081	2844465.056		NO	NO	8	13.349	5.349	0	50	0	0
J25	1007203.876	2845643.62		NO	NO	30.5	35.3	4.8	0	50	0	0
J26	1007233.433	2845579.973		NO	NO	30.1	35.3	5.2	0	50	0	0
J27	1009479.713	2846973.226		NO	NO	13	18	5	0	50	0	0
J28	1009425.906	2847038.355		NO	NO	13.18	18.9	5.72	0	50	0	0
J29	1009316.153	2847010.384		NO	NO	13.55	21.71	8.16	0	50	0	0
J3	1006870.603	2845395.681		NO	NO	27.7	32.743	5.043	0	50	0	0
J30	1009984.72	2847404.505	Connect2D_MH	NO	NO	4.8	9.3	4.5	0	30	0	0
J31	1009952.378	2847446.349	Connect2D_MH	NO	NO	5.1	9.4	4.3	0	30	0	0
J32	1009718.364	2847313.955		NO	NO	5.5	9.8	4.3	0	50	0	0
J34	1010360.502	2847758.742	Connect2D_MH	NO	NO	7.3	11.25	3.95	0	30	0	0
J4	1006494.893	2845267.078		NO	NO	25.7	30.676	4.976	0	50	0	0
J428	1011045.896	2845352.789	2D_label	NO	NO	2.588	32.588	30	0	0	0	0
J445	1011141.216	2847438.472		NO	NO	15.852	15.852	0	0	0	0	0
J5	1006199.682	2845072.656		NO	NO	23.5	28.576	5.076	0	50	0	0
J564	1010784.775	2847744.961		NO	NO	12.788	12.788	0	0	0	0	0
J6	1009085.26	2846666.103		NO	NO	22	27.428	5.428	0	50	0	0
J611	1010904.043	2847624.504		NO	NO	13.624	13.624	0	0	0	0	0
J66	1011342.74	2847268.156		NO	NO	19.557	19.557	0	0	0	0	0
J7	1006533.642	2845207.831		NO	NO	24	30.512	6.512	0	50	0	0
J71	1009577.703	2847181.403		NO	NO	9.194	14.177	4.983	0	30	0	0
J8	1006239.797	2845014.495		NO	NO	22.8	28.379	5.579	0	50	0	0
J9	1008626.945	2846408.03		NO	NO	32	36.8	4.8	0	50	0	0
MH1	1010530.644	2847959.58	Connect2D_MH	NO	NO	4.73	10.954	6.224	0	30	0	0

Table 3A: Junctions (continued...)

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Depth (ft)	Initial Depth (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Baseline (cfs)
MH10	1011511.543	2845270.131	Connect2D_MH	NO	NO	8.24	10.04	1.8	0	30	0	0
MH11	1011559.458	2845389.196	Connect2D_MH	NO	NO	8	11.188	3.188	0	30	0	0
MH12	1011608.36	2845458.27	Connect2D_MH	NO	NO	12	15.157	3.157	0	30	0	0
MH13	1011741.006	2845633.705	Connect2D_MH	NO	NO	24	28.74	4.74	0	30	0	0
MH14	1011862.65	2845807.307	Connect2D_MH	NO	NO	31	35.203	4.203	0	30	0	0
MH15	1011240.734	2844935.933	Connect2D_MH	NO	NO	25	30.512	5.512	0	30	0	0
MH16	1011171.126	2844842.863	Connect2D_MH	NO	NO	25.5	30.676	5.176	0	30	0	0
MH17	1011090.371	2844735.468	Connect2D_MH	NO	NO	28.44	32.448	4.008	0	30	0	0
MH18	1011481.215	2845295.06	Connect2D_MH	NO	NO	5.3	8.957	3.657	0	30	0	0
MH2	1010382.993	2847839.795	Connect2D_MH	NO	NO	5.58	11.867	6.287	0	30	0	0
MH3	1010459.751	2847754.847	Connect2D_MH	NO	NO	6.08	12.069	5.989	0	30	0	0
MH4	1010572.351	2847637.139	Connect2D_MH	NO	NO	7.83	12.009	4.179	0	30	0	0
MH8	1011482.438	2845231.488	Connect2D_MH	NO	NO	8.21	10.51	2.3	0	30	0	0
MH9	1011496.673	2845252.412	Connect2D_MH	NO	NO	8.1	10.1	2	0	30	0	0
OF-SP-1-WJ	1010515.721	2847973.034	Zone2	NO	NO	4.67	4.67	0	0	0	0	0
SC1	1010661.294	2846168.131		NO	NO	-3.77	6.43	10.2	0	0	0	0
SC-1	1011231.654	2845486.414	Connect2D_MHs	NO	NO	4.38	6.9	2.52	0	30	0	0
StillingBasin	1010383.704	2847143.951	Connect2D_MH	NO	NO	17.79	24.3	6.51	0	30	0	0

Table 3B: Junctions

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
_CourtStPond_Outlet			1	0						0	0.21	4.51	6.31
_Rt6Basin_OF			1	0						0	0.28	0.7	5.7
_SouthSPPondOF			1	0						0	2.36	3.41	6.41
CB1			1	0						0	0.04	0.96	6.54
CB10			1	0						0	0.01	0.89	7.25
CB101			1	0						0	0.26	2.94	9.52
CB104			1	0						0	0.54	5.14	16.67
CB105			1	0						0	0.2	3.09	20.71
CB112			1	0						0	0.42	4.34	13.32
CB2			1	0						0	0.06	1.16	7.24
CB27			1	0						0	0.03	1.37	9.37
CB28			1	0						0	0.15	3.84	9.34
CB29			1	0						0	2.75	3.39	15.27
CB3			1	0						0	0.04	1.12	7.25
CB30			1	0						0	2.29	3	15.37
CB31			1	0						0	0.03	2.67	11.52
CB32			1	0						0	0.09	3.71	11.92
CB33			1	0						0	0.43	5.13	10.68
CB35			1	0						0	0.13	18.09	24.85
CB36			1	0						0	0.16	19.49	26.49
CB37			1	0						0	0.16	20.45	27.68
CB38			1	0						0	0.14	20.38	28.23
CB4			1	0						0	0.61	10.06	6.9
CB6			1	0						0	0.51	9.17	6.59
DMH-03			1	0						0	0.22	2.8	10.3
DMH-06			1	0						0	0	0	9.1

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Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
DMH-07			1	0						0	0.22	3.5	11.4
DMH-08			1	0						0	0.17	3.44	12.44
DMH-09			1	0						0	0.12	2.33	13.43
DMH1			1	0						0	0.47	9.21	6.41
DMH-10			1	0						0	0.11	0.86	17.74
DMH-12			1	0						0	0.1	5.73	22.53
DMH-13			1	0						0	0.13	5.68	15.84
DMH-14			1	0						0	0.19	6.61	13.43
DMH-15			1	0						0	0.18	3.7	9.71
DMH-16			1	0						0	0.06	3.31	9.71
DMH-17			1	0						0	0.23	2.72	8.58
DMH-18			1	0						0	0.2	5.52	11.99
DMH2			1	0						0	0.62	10	6.39
DMH-25			1	0						0	0.05	1.89	7.94
DMH-26			1	0						0	0.42	2.41	7.94
DMH-27			1	0						0	0.79	2.86	7.94
DMH-28			1	0						0	1.44	2.22	6.42
DMH3			1	0						0	0.41	8.2	6.6
DMH-30			1	0						0	1.66	2.28	6.18
DMH-31			1	0						0	2.31	3.31	6.39
DMH-32			1	0						0	0.44	1.95	6.43
DMH-32_Weir			1	0						0	0.67	2	6.42
J1			1	0						0	0.04	0.6	28
J10			1	0						0	0.02	0.28	31.28
J11			1	0						0	0.05	1.19	22.19
J1145			1	0						0	0.05	1.27	6.29

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Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
J12			1	0						0	0.06	1.11	17.61
J13			1	0						0	0.07	1.02	21.72
J1334			1	0						0	0	0.11	7.03
J14			1	0						0	0.03	0.31	33.31
J15			1	0						0	0.05	0.59	33.79
J155			1	0						0	0.37	0.56	7.74
J1574			1	0						0	0.02	0.24	8.1
J16			1	0						0	0.02	0.24	35.24
J17			1	0						0	0.03	0.36	35.96
J18			1	0						0	0.03	0.41	14.15
J2			1	0						0	0.05	0.78	22.18
J20			1	0						0	0.05	0.69	16.69
J22			1	0						0	0.02	0.29	14.79
J23			1	0						0	0.06	1.38	9.38
J25			1	0						0	0.05	0.84	31.34
J26			1	0						0	0.06	0.74	30.84
J27			1	0						0	0.53	55	68
J28			1	0						0	0.3	47.69	60.87
J29			1	0						0	0.32	52.23	65.78
J3			1	0						0	0.04	0.62	28.32
J30			1	0						0	0.13	4.61	9.41
J31			1	0						0	0.09	4.48	9.58
J32			1	0						0	0.19	18.14	23.64
J34			1	0						0	0	0	7.3
J4			1	0						0	0.03	0.42	26.12
J428			1	0						0	2.69	3.82	6.41

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Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
J445			1	0						0	0.01	0.29	16.14
J5			1	0						0	0.04	0.55	24.05
J564			1	0						0	0.02	0.41	13.2
J6			1	0						0	0.09	3.57	25.57
J611			1	0						0	0.02	0.46	14.08
J66			1	0						0	0	0.19	19.75
J7			1	0						0	0.03	0.34	24.34
J71			1	0						0	0.24	32.41	41.6
J8			1	0						0	0.04	0.49	23.29
J9			1	0						0	0	0	32
MH1			1	0						0	0.29	1.41	6.14
MH10			1	0						0	0.01	1.11	9.35
MH11			1	0						0	0.11	3.52	11.52
MH12			1	0						0	0.07	3.3	15.3
MH13			1	0						0	0.04	0.48	24.48
MH14			1	0						0	0.03	0.31	31.31
MH15			1	0						0	0.04	0.49	25.49
MH16			1	0						0	0.08	1.12	26.62
MH17			1	0						0	0.02	0.26	28.7
MH18			1	0						0	0.34	4.05	9.35
MH2			1	0						0	0.23	1.89	7.47
MH3			1	0						0	0.24	2.24	8.32
MH4			1	0						0	0.33	4.52	12.35
MH8			1	0						0	0.04	1.14	9.35
MH9			1	0						0	0.14	1.25	9.35
OF-SP-1-WJ			1	0						0	0.28	1.07	5.74

DRAFT

Table 3B: Junctions (continued...)

Name	Baseline Pattern	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)
SC1			1	0						0	0.62	10.11	6.34
SC-1			1	0						0	0.48	2.02	6.4
StillingBasin			1	0						0	0.13	1.17	18.96

Table 3C: Junctions

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Time Pattern 1	Total Lat. Inflow (MG)	Time Pattern 2	Total inflow (MG)	Time Pattern 3	Flow Error (%)	Time Pattern 4	Hours Surcharged (h)	Hydrograph	Max. Surcharge (ft)	Sewershed Area (ac)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
_CourtStPond_Outlet	10/31/2018 12:05 PM	4.51	0	6.96		0		0.079		0.018		0		0	0	-0.31	0	0	0
_Rt6Basin_OF	10/31/2018 12:09 PM	0.7	0	26.62		0		1.54		1.261		0		0	0	1.3	0	0	0
_SouthSPPondOF	10/31/2018 15:28 PM	3.41	0	8.37		0		1.08		4.836		0		0	0	26.662	0	0	0
CB1	10/31/2018 12:05 PM	0.96	0	4.54		0		0.131		-0.001		0		0	0	4.79	0	0	0
CB10	10/31/2018 12:05 PM	0.88	0	0.02		0		0		-0.022		0		0	0	3.91	0	0	0
CB101	10/31/2018 12:07 PM	2.94	0	4.92		0		0.88		0		0		0	0	2.66	0	0	0
CB104	10/31/2018 12:10 PM	5.14	9.87	13.63		0.303		0.918		-0.062		0		0	0	-0.701	0	0	0
CB105	10/31/2018 12:20 PM	3.09	24.47	24.47		0.975		0.975		0.004		0		0	0	-1.036	0	0	0
CB112	10/31/2018 12:14 PM	4.34	0	3.37		0		0.677		-0.002		0		0	0	-0.502	0	0	0
CB2	10/31/2018 12:05 PM	1.16	4.58	4.58		0.131		0.131		0		0		0	0	3.89	0	0	0
CB27	10/31/2018 12:05 PM	1.36	0.47	0.56		0.015		0.018		-0.008		0		0	0	0.669	0	0	0
CB28	10/31/2018 12:05 PM	3.84	0.39	0.74		0.013		0.013		0.007		0		0	0	-0.09	0	0	0
CB29	10/31/2018 12:05 PM	3.39	5.17	6.53		0.163		0.206		0.06		0		0	0	-1.09	0	0	0
CB3	10/31/2018 12:05 PM	1.11	0	0.05		0		0		0.014		0		0	0	3.98	0	0	0
CB30	10/31/2018 12:05 PM	3	1.37	1.37		0.044		0.044		0.182		0		0	0	-0.2	0	0	0
CB31	10/31/2018 12:05 PM	2.66	0	0.03		0		0		0.026		0		0	0	0.18	0	0	0
CB32	10/31/2018 12:05 PM	3.71	2.55	2.55		0.074		0.074		0.001		0		0	0	-1.01	0	0	0

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
CB33	10/31/2018 12:05 PM	5.13	30.27	30.27	0.907	1.32	0.003	0	0	-1.63	0	0	0
CB35	10/31/2018 12:05 PM	18.07	0	6.26	0	0.179	-0.005	0.61	17.089	0	0	0	0
CB36	10/31/2018 12:05 PM	19.47	1.68	6.26	0.046	0.179	-0.005	0.61	18.489	0	0	0	0
CB37	10/31/2018 12:05 PM	20.43	0.38	4.58	0.016	0.133	-0.007	0.6	19.45	0	0	0	0
CB38	10/31/2018 12:05 PM	20.37	4.2	4.2	0.117	0.117	-0.007	0.55	19.383	0	0	0	0
CB4	10/31/2018 12:05 PM	10.06	43.74	43.74	1.25	1.58	0.002	0	0	-1.9	0	0	0
CB6	10/31/2018 12:17 PM	9.17	0	7.25	0	0.269	0.036	0	0	-1.19	0	0	0
DMH-03	10/31/2018 12:05 PM	2.78	3.59	26.12	0.102	1.77	0.038	0	0	2.14	0	0	0
DMH-06	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	4.27	0	0	0
DMH-07	10/31/2018 12:05 PM	3.48	11.06	22.62	0.315	1.67	-0.058	0	0	3.4	0	0	0
DMH-08	10/31/2018 12:05 PM	3.44	0	11.91	0	1.35	-0.005	0	0	3.267	0	0	0
DMH-09	10/31/2018 12:06 PM	2.33	0	11.92	0	1.36	0.187	0	0	5.41	0	0	0
DMH1	10/31/2018 12:05 PM	9.17	0	6.96	0	0.081	-0.038	2.54	3.33	0.36	0	0	0
DMH-10	10/31/2018 12:05 PM	0.86	3.06	11.97	0.094	1.36	-0.015	0	0	7.61	0	0	0
DMH-12	10/31/2018 12:10 PM	5.73	12.56	12.56	0.468	0.468	-0.004	0	0	-0.157	0	0	0
DMH-13	10/31/2018 12:07 PM	5.68	19.19	28.4	0.553	1.02	0.062	0	0	1.947	0	0	0
DMH-14	10/31/2018 12:07 PM	6.6	2.48	30.07	0.074	1.09	-0.004	0	0	1.961	0	0	0
DMH-15	10/31/2018 12:07 PM	3.7	0	30.89	0	1.13	0	0	0	3.037	0	0	0
DMH-16	10/31/2018 12:07 PM	3.31	0	0.08	0	0	-0.114	0	0	2.026	0	0	0
DMH-17	10/31/2018 12:07 PM	2.72	0	30.89	0	1.13	0.004	0	0	1.42	0	0	0
DMH-18	10/31/2018 12:07 PM	5.51	1.01	30.91	0.031	1.12	0	0	0	2.785	0	0	0
DMH2	10/31/2018 12:05 PM	10	0	16.86	0	1.34	-0.002	0	0	-0.09	0	0	0
DMH-25	10/31/2018 12:05 PM	1.89	0	0.15	0	0	0.046	0	0	0.76	0	0	0
DMH-26	10/31/2018 12:05 PM	2.41	0	0.43	0	0.002	19.758	0	0	0.06	0	0	0
DMH-27	10/31/2018 12:05 PM	2.86	14.11	14.11	0.4	0.401	0.293	0	0	-0.54	0	0	0
DMH-28	10/31/2018 12:06 PM	2.22	4.87	10.88	0.147	0.802	0.186	0	0	-0.629	0	0	0

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
DMH3	10/31/2018 12:17 PM	8.19	0	1.91	0	0.002	0.148	0	0	-0.5	0	0	0
DMH-30	10/31/2018 14:29 PM	2.28	0.22	5.86	0.007	1.07	0.152	0	0	-0.38	0	0	0
DMH-31	10/31/2018 15:27 PM	3.31	0	7.7	0	1.08	0.209	0	0	0.464	0	0	0
DMH-32	10/31/2018 15:58 PM	1.93	3.8	4.04	0.12	0.136	0.517	0	0	0.5	0	0	0
DMH-32_Weir	10/31/2018 15:58 PM	1.99	0	3.29	0	0.045	-10.353	8.48	0.504	0.49	0	0	0
J1	10/31/2018 12:05 PM	0.6	1.93	3.27	0.053	0.091	0.002	0	0	4.9	0	0	0
J10	10/31/2018 12:05 PM	0.28	1.73	1.73	0.048	0.048	0	0	0	5.32	0	0	0
J11	10/31/2018 12:05 PM	1.19	3.26	3.26	0.091	0.091	0	0.09	0.195	3.92	0	0	0
J1145	10/31/2018 12:28 PM	1.27	0	20.17	0	0.307	0	0	0	28.722	0	0	0
J12	10/31/2018 12:05 PM	1.11	3.43	3.43	0.099	0.099	-0.001	0.04	0.114	3.586	0	0	0
J13	10/31/2018 12:05 PM	1.01	4.12	7.38	0.115	0.206	0	0	0	3.458	0	0	0
J1334	10/31/2018 12:05 PM	0.11	0	5.17	0	0.035	0.001	0	0	29.885	0	0	0
J14	10/31/2018 12:05 PM	0.3	0	1.37	0	0.042	0	0	0	4.89	0	0	0
J15	10/31/2018 12:05 PM	0.59	1.38	1.38	0.042	0.042	0	0	0	4.41	0	0	0
J155	10/31/2018 12:05 PM	0.56	13.66	13.66	0.379	0.38	1.258	0	0	-0.555	0	0	0
J1574	10/31/2018 12:05 PM	0.23	0	18.65	0	0.793	0.03	0	0	29.765	0	0	0
J16	10/31/2018 12:05 PM	0.24	0	0.74	0	0.022	0.001	0	0	5.36	0	0	0
J17	10/31/2018 12:05 PM	0.36	0.74	0.74	0.022	0.022	-0.001	0	0	4.657	0	0	0
J18	10/31/2018 12:05 PM	0.41	1.88	1.88	0.054	0.054	0	0	0	3.82	0	0	0
J2	10/31/2018 12:05 PM	0.78	0	6.22	0	0.195	0	0	0	5.62	0	0	0
J20	10/31/2018 12:05 PM	0.69	1.95	5.38	0.059	0.158	0	0	0	4.51	0	0	0
J22	10/31/2018 12:05 PM	0.29	1.43	1.43	0.041	0.041	0.001	0	0	4.21	0	0	0
J23	10/31/2018 12:05 PM	1.37	0	6.78	0	0.199	-0.001	0.1	0.377	3.972	0	0	0
J25	10/31/2018 12:05 PM	0.84	2.58	2.58	0.071	0.071	0.001	0	0	3.96	0	0	0
J26	10/31/2018 12:15 PM	0.74	5.39	6.75	0.218	0.289	0	0	0	4.46	0	0	0
J27	10/31/2018 12:04 PM	55	8.97	8.97	0.264	0.264	0.009	1	54	0	0.01	0.05	0

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
J28	10/31/2018 12:05 PM	47.69	2.05	17.47	0.065	0.508	-0.004	0.51	46.441	0	0	0	0
J29	10/31/2018 12:05 PM	52.23	6.5	6.5	0.179	0.179	0	0.62	51.231	0	0	0	0
J3	10/31/2018 12:05 PM	0.62	1.35	1.35	0.038	0.038	-0.004	0	0	4.423	0	0	0
J30	10/31/2018 12:05 PM	4.61	7.83	9.5	0.243	0.335	0	0	0	-0.11	0	0	0
J31	10/31/2018 12:05 PM	4.48	3.65	3.65	0.1	0.1	0.002	0	0	-0.18	0	0	0
J32	10/31/2018 12:05 PM	18.13	0	23.73	0	0.687	-0.003	0.69	16.894	0	0	0	0
J34	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	3.95	0	0	0
J4	10/31/2018 12:05 PM	0.42	1.68	1.68	0.047	0.047	0	0	0	4.556	0	0	0
J428	10/31/2018 15:29 PM	3.82	30.39	30.39	0.958	0.998	0	0	0	26.178	0	0	0
J445	10/31/2018 12:16 PM	0.29	0	28.33	0	0.628	0	0	0	0.212	0	0	0
J5	10/31/2018 12:05 PM	0.55	1.79	1.79	0.061	0.061	0.009	0	0	4.526	0	0	0
J564	10/31/2018 12:15 PM	0.41	0	50.59	0	1.42	0	0	0	0.088	0	0	0
J6	10/31/2018 12:05 PM	3.57	6.22	6.22	0.195	0.195	-0.004	0.43	2.573	1.855	0	0	0
J611	10/31/2018 12:15 PM	0.46	22.75	49.97	0.776	1.4	0	0	0	0.044	0	0	0
J66	10/31/2018 12:20 PM	0.19	0	20.42	0	0.361	0	0	0	0.307	0	0	0
J7	10/31/2018 12:05 PM	0.34	1.77	3.44	0.05	0.096	0	0	0	6.172	0	0	0
J71	10/31/2018 12:05 PM	32.4	0	17.47	0	0.508	-0.008	0.56	31.159	0	0	0	0
J8	10/31/2018 12:05 PM	0.49	4.24	6.02	0.133	0.193	-0.003	0	0	5.089	0	0	0
J9	10/31/2018 00:00 AM	0	0	0	0	0	0	0	0	4.8	0	0	0
MH1	10/31/2018 12:05 PM	1.41	0	9.3	0	1.01	0.01	0	0	4.814	0	0	0
MH10	10/31/2018 12:05 PM	1.1	0	0.13	0	0.002	-0.004	0	0	0.69	0	0	0
MH11	10/31/2018 12:05 PM	3.51	0.19	9.16	0.006	0.286	-0.007	0	0	-0.332	0	0	0
MH12	10/31/2018 12:05 PM	3.3	3.16	6.7	0.094	0.206	-0.007	0	0	-0.143	0	0	0
MH13	10/31/2018 12:05 PM	0.48	2.49	3.56	0.08	0.112	-0.002	0	0	4.26	0	0	0
MH14	10/31/2018 12:05 PM	0.31	1.08	1.08	0.032	0.032	0.005	0	0	3.893	0	0	0
MH15	10/31/2018 12:05 PM	0.49	0.68	3.46	0.02	0.112	-0.014	0	0	5.022	0	0	0

REVIEW

Table 3C: Junctions (continued...)

Name	Time Max. HGL (M/D/Y)	Contributing Area (ac)	Rep. Max. Depth (ft)	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)
MH16	10/31/2018 12:05 PM	0	1.11	2.17	2.88	0.069	0.092	-0.001	0	0	4.056	0	0	0
MH17	10/31/2018 12:05 PM	0	0.26	0.71	0.71	0.023	0.023	-0.002	0	0	3.748	0	0	0
MH18	10/31/2018 12:05 PM	0	4.05	0	13.35	0	1.52	0.038	0	0	-0.393	0	0	0
MH2	10/31/2018 12:06 PM	0	1.89	0	4.94	0	0.88	-0.003	0	0	4.397	0	0	0
MH3	10/31/2018 12:06 PM	0	2.23	0	4.93	0	0.88	0	0	0	3.749	0	0	0
MH4	10/31/2018 12:10 PM	0	4.52	8.05	10.05	0.268	0.931	0	0	0	-0.341	0	0	0
MH8	10/31/2018 12:05 PM	0	1.13	0	0.03	0	0.001	0.109	0	0	1.16	0	0	0
MH9	10/31/2018 12:05 PM	0	1.25	0	0.08	0	0.002	0.623	0	0	0.75	0	0	0
OF-SP-1-WJ	10/31/2018 12:05 PM	0	1.07	0	9.3	0	1.01	0.002	0	0	0.43	0	0	0
SC1	10/31/2018 12:04 PM	0	10.08	0	16.34	0	1.26	0.004	2.7	8.113	0.087	0	0	0
SC-1	10/31/2018 15:59 PM	0	2.01	0	1.81	0	0.111	-0.046	0	0	0.5	0	0	0
StillingBasin	10/31/2018 11:38 AM	0	0.97	0	8.91	0	1.26	-0.182	0	0	5.34	0	0	0

Table 3D: Junctions

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_CourtStPond_Outlet	0	0	0	0	0	0	1
_Rt6Basin_OF	0	0	0	0	0	0	1
_SouthSPPondOF	0	0	0	0	0	0	1
CB1	0	0	0	0	0	0	1
CB10	0	0	0	0	0	0	1
CB101	0	0	0	0	0	0	1
CB104	0	0	0	0	0	0	1
CB105	0	0	0	0	0	0	1

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
CB112	0	0	0	0	0	0	1
CB2	0	0	0	0	0	0	1
CB27	0	0	0	0	0	0	1
CB28	0	0	0	0	0	0	1
CB29	0	0	0	0	0	0	1
CB3	0	0	0	0	0	0	1
CB30	0	0	0	0	0	0	1
CB31	0	0	0	0	0	0	1
CB32	0	0	0	0	0	0	1
CB33	0	0	0	0	0	0	1
CB35	0	0	0	0	0	0	1
CB36	0	0	0	0	0	0	1
CB37	0	0	0	0	0	0	1
CB38	0	0	0	0	0	0	1
CB4	0	0	0	0	0	0	1
CB6	0	0	0	0	0	0	1
DMH-03	0	0	0	0	0	0	1
DMH-06	0	0	0	0	0	0	1
DMH-07	0	0	0	0	0	0	1
DMH-08	0	0	0	0	0	0	1
DMH-09	0	0	0	0	0	0	1
DMH1	0	0	0	0	0	0	1
DMH-10	0	0	0	0	0	0	1
DMH-12	0	0	0	0	0	0	1
DMH-13	0	0	0	0	0	0	1
DMH-14	0	0	0	0	0	0	1

Hard

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
DMH-15	0	0	0	0	0	0	1
DMH-16	0	0	0	0	0	0	1
DMH-17	0	0	0	0	0	0	1
DMH-18	0	0	0	0	0	0	1
DMH2	0	0	0	0	0	0	1
DMH-25	0	0	0	0	0	0	1
DMH-26	0	0	0	0	0	0	1
DMH-27	0	0	0	0	0	0	1
DMH-28	0	0	0	0	0	0	1
DMH3	0	0	0	0	0	0	1
DMH-30	0	0	0	0	0	0	1
DMH-31	0	0	0	0	0	0	1
DMH-32	0	0	0	0	0	0	1
DMH-32_Weir	0	0	0	0	0	0	1
J1	0	0	0	0	0	0	1
J10	0	0	0	0	0	0	1
J11	0	0	0	0	0	0	1
J1145	0	0	0	0	0	0	1
J12	0	0	0	0	0	0	1
J13	0	0	0	0	0	0	1
J1334	0	0	0	0	0	0	1
J14	0	0	0	0	0	0	1
J15	0	0	0	0	0	0	1
J155	0	0	0	0	0	0	1
J1574	0	0	0	0	0	0	1
J16	0	0	0	0	0	0	1

Hydro

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J17	0	0	0	0	0	0	1
J18	0	0	0	0	0	0	1
J2	0	0	0	0	0	0	1
J20	0	0	0	0	0	0	1
J22	0	0	0	0	0	0	1
J23	0	0	0	0	0	0	1
J25	0	0	0	0	0	0	1
J26	0	0	0	0	0	0	1
J27	50	0	0	0	0	0	1
J28	0	0	0	0	0	0	1
J29	0	0	0	0	0	0	1
J3	0	0	0	0	0	0	1
J30	0	0	0	0	0	0	1
J31	0	0	0	0	0	0	1
J32	0	0	0	0	0	0	1
J34	0	0	0	0	0	0	1
J4	0	0	0	0	0	0	1
J428	0	0	0	0	0	0	1
J445	0	0	0	0	0	0	1
J5	0	0	0	0	0	0	1
J564	0	0	0	0	0	0	1
J6	0	0	0	0	0	0	1
J611	0	0	0	0	0	0	1
J66	0	0	0	0	0	0	1
J7	0	0	0	0	0	0	1
J71	0	0	0	0	0	0	1

Hard

Table 3D: Junctions (continued...)

Name	Max. Ponded Depth (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
J8	0	0	0	0	0	0	1
J9	0	0	0	0	0	0	1
MH1	0	0	0	0	0	0	1
MH10	0	0	0	0	0	0	1
MH11	0	0	0	0	0	0	1
MH12	0	0	0	0	0	0	1
MH13	0	0	0	0	0	0	1
MH14	0	0	0	0	0	0	1
MH15	0	0	0	0	0	0	1
MH16	0	0	0	0	0	0	1
MH17	0	0	0	0	0	0	1
MH18	0	0	0	0	0	0	1
MH2	0	0	0	0	0	0	1
MH3	0	0	0	0	0	0	1
MH4	0	0	0	0	0	0	1
MH8	0	0	0	0	0	0	1
MH9	0	0	0	0	0	0	1
OF-SP-1-WJ	0	0	0	0	0	0	1
SC1	0	0	0	0	0	0	1
SC-1	0	0	0	0	0	0	1
StillingBasin	0	0	0	0	0	0	1

Hydro

Table 4A: Orifices

Name	Inlet Node	Outlet Node	Tag	Type	Cross-Section	Height (ft)	Width (ft)	Inlet Offset (ft)	Discharge Coeff.	Flap Gate	Time to Open/Close (h)	Control Rules	Max. |Flow| (cfs)
OR1	_CourtStWetlandArea	_CourtStPond_Outlet		BOTTOM	RECT_CLOSED	4	2	3	0.65	NO	0	NO	6.95
OR108	CB104	J445		BOTTOM	RECT_CLOSED	2	2	4.439	0.65	NO	0	NO	10.82
OR131	CB112	J564		BOTTOM	RECT_CLOSED	2	2	3.838	0.65	NO	0	NO	0.74
OR21	DMH-13	J978		BOTTOM	RECT_CLOSED	2	2	7.627	0.65	NO	0	NO	0
OR23	DMH-28	J1379		BOTTOM	RECT_CLOSED	2	2	1.591	0.65	NO	0	NO	0.84
OR45	CB105	J66		BOTTOM	RECT_CLOSED	2	2	2.054	0.65	NO	0	NO	20.42
OR5	DMH-28	J1402		BOTTOM	RECT_CLOSED	2	2	1.361	0.65	NO	0	NO	0.86

Table 4B: Orifices

Name	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m^2)	GIS_PARTS
OR1	10/31/2018 12:05 PM	0	0	0	0	19.804	0	1
OR108	10/31/2018 12:05 PM	0	0	0	0	3.422	0	1
OR131	10/31/2018 12:06 PM	0	0	0	0	3.186	0	1
OR21	10/31/2018 12:21 PM	0	0	0	0	11.146	0	1
OR23	10/31/2018 11:52 AM	0	0	0	0	25.907	0	1
OR45	10/31/2018 12:20 PM	0	0	0	0	3.694	0	1
OR5	10/31/2018 11:49 AM	0	0	0	0	13.284	0	1

Table 5A: Outfalls

Name	X-Coordinate	Y-Coordinate	Tag	Inflows	Treatment	Invert Elev. (ft)	Rim Elev. (ft)	Tide Gate	Route To	Type	Fixed Stage (ft)	Curve Name	Series Name	Outlet	Baseline (cfs)	Baseline Pattern
OF-RS-10-S	1008709.714	2846286.735	Zone1	NO	NO	23.64	23.64	NO		FREE	0	*	*		0	
OF-RS-11-N	1008997.279	2846761.397	Zone1	NO	NO	18.64	18.64	NO		FREE	0	*	*		0	
OF-RS-12-N	1009705.646	2847331.275	Zone1	NO	NO	4.5	4.5	NO		FREE	0	*	*		0	
OF-RS-13-S	1010007.673	2847359.157	Zone1	NO	NO	4.12	4.12	NO		FREE	0	*	*		0	
OF-RS-1-N	1005291.471	2844369.017		NO	NO	12.17	12.17	NO		FREE	0	*	*		0	
OF-RS-2-N	1005381.777	2844473.665		NO	NO	7.26	7.26	NO		FREE	0	*	*		0	
OF-RS-3-N	1005823.967	2844899.856		NO	NO	19.37	19.37	NO		FREE	0	*	*		0	
OF-RS-4-S	1006279.282	2844959.564		NO	NO	11.15	11.15	NO		FREE	0	*	*		0	
OF-RS-5-S	1006567.492	2845149.66		NO	NO	10.22	10.22	NO		FREE	0	*	*		0	
OF-RS-6-N	1006807.849	2845520.893	Zone1	NO	NO	25.67	25.67	NO		FREE	0	*	*		0	
OF-RS-7-S	1007261.284	2845510.96	Zone1	NO	NO	25.15	25.15	NO		FREE	0	*	*		0	
OF-RS-8-N	1007630.539	2845893.742	Zone1	NO	NO	30.08	30.08	NO		FREE	0	*	*		0	
OF-RS-9-N	1007998.589	2846072.311	Zone1	NO	NO	33.13	33.13	NO		FREE	0	*	*		0	

Table 5B: Outfalls

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-10-S		1	0						0	0.02	0.27	23.91	10/31/2018 12:05 PM	0.27
OF-RS-11-N		1	0						0	0.05	0.69	19.33	10/31/2018 12:05 PM	0.69
OF-RS-12-N		1	0						0	0.09	1	5.5	10/31/2018 11:51 AM	1
OF-RS-13-S		1	0						0	0.09	1	5.12	10/31/2018 11:56 AM	1
OF-RS-1-N		1	0						0	0.03	0.38	12.55	10/31/2018 12:05 PM	0.38
OF-RS-2-N		1	0						0	0.06	0.8	8.06	10/31/2018 12:05 PM	0.8
OF-RS-3-N		1	0						0	0.06	0.95	20.32	10/31/2018 12:05 PM	0.95

DRAFT

Table 5B: Outfalls (continued...)

Name	Time Series	Scale Factor	Average Value (cfs)	Time Pattern 1	Time Pattern 2	Time Pattern 3	Time Pattern 4	Hydrograph	Sewershed Area (ac)	Avg. Depth (ft)	Max. Depth (ft)	Max. HGL (ft)	Time Max. HGL (M/D/Y)	Rep. Max. Depth (ft)
OF-RS-4-S		1	0						0	0.03	0.46	11.61	10/31/2018 12:05 PM	0.46
OF-RS-5-S		1	0						0	0.02	0.32	10.54	10/31/2018 12:05 PM	0.32
OF-RS-6-N		1	0						0	0.04	0.56	26.23	10/31/2018 12:05 PM	0.56
OF-RS-7-S		1	0						0	0.05	0.67	25.82	10/31/2018 12:15 PM	0.67
OF-RS-8-N		1	0						0	0.03	0.29	30.37	10/31/2018 12:05 PM	0.29
OF-RS-9-N		1	0						0	0.02	0.23	33.36	10/31/2018 12:05 PM	0.23

Table 5C: Outfalls

Name	Max. Lat. Inflow (cfs)	Max. Total Inflow (cfs)	Total Lat. Inflow (MG)	Total inflow (MG)	Flow Error (%)	Hours Surcharged (h)	Max. Surcharge (ft)	Min. Freeboard (ft)	Hours Flooded (h)	Max. Flood Rate (cfs)	Total Flood Vol. (MG)	Max. Ponded Depth (ft)	Flow Frequency	Avg. Flow (cfs)	Max. Flow (cfs)	Total Flow (MG)
OF-RS-10-S	0	1.73	0	0.048	0	0	0	0	0	0	0	0	34.08	0.11	1.73	0.048
OF-RS-11-N	0	6.22	0	0.195	0	0	0	0	0	0	0	0	32.48	0.47	6.22	0.195
OF-RS-12-N	0	23.73	0	0.687	0	0	0	0	0	0	0	0	35.61	1.5	23.73	0.687
OF-RS-13-S	32.39	40.91	0.931	1.26	0	0	0	0	0	0	0	0	44.23	2.22	40.91	1.264
OF-RS-1-N	0	1.88	0	0.054	0	0	0	0	0	0	0	0	40.59	0.1	1.88	0.054
OF-RS-2-N	0	6.78	0	0.199	0	0	0	0	0	0	0	0	47.57	0.33	6.78	0.199
OF-RS-3-N	0	7.37	0	0.206	0	0	0	0	0	0	0	0	38.09	0.42	7.37	0.206
OF-RS-4-S	0	6.02	0	0.193	0	0	0	0	0	0	0	0	34.09	0.44	6.02	0.193
OF-RS-5-S	0	3.44	0	0.096	0	0	0	0	0	0	0	0	38.34	0.2	3.44	0.096
OF-RS-6-N	0	3.26	0	0.091	0	0	0	0	0	0	0	0	36.84	0.19	3.26	0.091
OF-RS-7-S	0	6.75	0	0.289	0	0	0	0	0	0	0	0	35.89	0.62	6.75	0.289
OF-RS-8-N	0	1.37	0	0.042	0	0	0	0	0	0	0	0	45	0.07	1.37	0.042
OF-RS-9-N	0.1	0.77	0.007	0.029	0	0	0	0	0	0	0	0	42.37	0.05	0.77	0.029

DRAFT

Table 5D: Outfalls

Name	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
OF-RS-10-S	0	0	0	0	0	1
OF-RS-11-N	0	0	0	0	0	1
OF-RS-12-N	0	0	0	0	0	1
OF-RS-13-S	0	0	0	0	0	1
OF-RS-1-N	0	0	0	0	0	1
OF-RS-2-N	0	0	0	0	0	1
OF-RS-3-N	0	0	0	0	0	1
OF-RS-4-S	0	0	0	0	0	1
OF-RS-5-S	0	0	0	0	0	1
OF-RS-6-N	0	0	0	0	0	1
OF-RS-7-S	0	0	0	0	0	1
OF-RS-8-N	0	0	0	0	0	1
OF-RS-9-N	0	0	0	0	0	1

Table 6A: Conduits

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
_C101	_CourtStPond_Outlet	DMH1	prop	36.453	0.011	0	3.88	0	0	0.5	0	0
_C102	CB4	DMH2	prop	77.715	0.011	0	0	0	0	0.5	0	0
_C105	DMH3	CB6	prop	145.588	0.011	0	0	0	0	0.5	0	0
_C107	DMH-17	_CourtStWetlandArea	Zone4	20	0.011	0	2.7	0	0	0.5	0	0
C1	CB105	CB104		263.405	0.014	0	0.15	0	0	0.5	0	0
C10	J20	J23		207.904	0.014	0	0	0	0	0.5	0	0
C103	DMH2	SC1	prop	14.373	0.011	0	0	0	0	0.5	0	0

LEVEL

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C103_1	DMH-13	DMH-14	prop	166.97	0.011	0	0	0	0	0.5	0	0
C105	DMH1	DMH2		29.411	0.01	0	0	0	0	0	0	0
C107	CB6	CB4	prop	95.958	0.011	0	0	0	0	0.5	0	0
C109	DMH-12	DMH-13	prop	265.697	0.011	0	0	0	0	0.5	0	0
C11	CB10	CB3		28.475	0.014	0	0	0	0	0.5	0	0
C111	J66	J445	road	263.865	0.011	0	0	0	0	0	0	0
C115	DMH-09	DMH-08	prop	70.423	0.011	0	0	0	0	0.5	0	0
C12	CB3	CB2		48.17	0.014	0	0	0	0	0.5	0	0
C13	CB2	CB1		25.561	0.014	0	0	0	0	0.5	0	0
C14	DMH-30	DMH-31		217.068	0.011	0	0	0	0	0.5	0	0
C141	SC1	_PSWetWell	prop	16.979	0.011	0	9	0	0	0.5	0	0
C1418	DMH-14	DMH-18	prop	58.106	0.011	0	0	0	0	0.5	0	0
C15	DMH-18	DMH-15		114.64	0.011	0	0	0	0	0.5	0	0
C155	DMH-27	DMH-28	prop	217.352	0.011	0	0	0	0	0.5	0	0
C16	DMH-16	DMH-15		48.81	0.011	0	0	0	0	0.5	0	0
C17	DMH-26	DMH-27	prop	107.718	0.011	0	0	0	0	0.5	0	0
C18	MH18	WinthropPond	Zone6	482.605	0.011	0	0	0	0	0.5	0	0
C19	StillingBasin	DMH-10		99.75	0.011	0	0	0	0	0	0	0
C19_2	DMH-32_Weir	DMH-31		32.607	0.011	0	0.67	0	0	0	0	0
C2	CB104	CB112		471.27	0.014	0	0.89	0	0	0.5	0	0
C20	DMH-32	SC-1		23.899	0.011	0	0	0	0	0.5	0	0
C21	DMH-10	DMH-09	prop	203.077	0.011	0	0	0	0	0.5	0	0
C21017	J1405	J369	2D_Winthrop	19.627	0.011	0	0	0	0	0	0	0
C21018	J1382	J369	2D_Winthrop	22.144	0.011	0	0	0	0	0	0	0
C21048	J1383	J370	2D_Winthrop	26.203	0.011	0	0	0	0	0	0	0
C21088	J1383	J361	2D_Winthrop	26.17	0.011	0	0	0	0	0	0	0

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C21134	J1382	J361	2D_Winthrop	21.554	0.011	0	0	0	0	0	0	0
C21144	J1361	J361	2D_Winthrop	16.278	0.011	0	0	0	0	0	0	0
C22	DMH-08	DMH-07	prop	77.395	0.011	0	0	0	0	0.5	0	0
C22143	J1140	J218	2D_Court	23.818	0.011	0	0	0	0	0	0	0
C22244	J1105	_CourtStWetlandArea	2D_Court	25.776	0.011	0	1	0	0	0	0	0
C22267	J1105	J210	2D_Court	21.342	0.011	0	0	0	0	0	0	0
C22328	J1084	J210	2D_Court	20.667	0.011	0	0	0	0	0	0	0
C22348	J200	J210	2D_Court	24.248	0.15	0	0	0	0	0	0	0
C23	DMH-07	DMH-03	prop	97.892	0.011	0	0	0	0	0.5	0	0
C2314	SC-1	SU1		8.155	0.011	0	0.5	0	0	0.5	0	0
C24	J34	_Rt6Basin&Forebay	prop	98.475	0.011	0	4.1	0	0	0.5	0	0
C2406	J433	J432	2D_SouthShankPainter	29.38	0.15	0	0	0	0	0	0	0
C2414	J421	J432	2D_SouthShankPainter	27.713	0.15	0	0	0	0	0	0	0
C2454	J421	J420	2D_SouthShankPainter	27.174	0.15	0	0	0	0	0	0	0
C2489	J1562	J420	2D_SouthShankPainter	22.535	0.011	0	0	0	0	0	0	0
C25	DMH-06	J34	prop	51.398	0.011	0	1.3	0	0	0.5	0	0
C2547	J1550	_SouthSPPondOF	2D_SouthShankPainter	26.212	0.011	0	0.072	0	0	0	0	0
C2549	J1538	_SouthSPPondOF	2D_SouthShankPainter	26.943	0.011	0	0.072	0	0	0	0	0
C2592	J1521	J400	2D_SouthShankPainter	18.564	0.011	0	0	0	0	0	0	0
C26	Rt6Drywells	_Rt6Basin&Forebay	prop	177.669	0.011	3.43	4.1	0	0	0.5	0	0
C27	J23	OF-RS-2-N		16.68	0.014	0	0	0	0	0.5	0	0
C28	DMH-03	_Rt6Basin&Forebay	prop	95.514	0.011	0	4.1	0	0	0.5	0	0
C2988	J1425	J369	2D_Winthrop	25.153	0.011	0	0	0	0	0	0	0
C3	CB112	MH4		247.982	0.014	0	0	0	0	0.5	0	0
C30	DMH-31	_SouthSPPondOF	Zone5	43.924	0.011	0	0	0	0	0.5	0	0
C31	CB36	CB35		31.906	0.014	0	0	0	0	0.5	0	0

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C33	CB1	MH1		12.784	0.011	0	0	0	0	0.5	0	0
C37	CB30	DW#9		15.234	0.014	0	0	0	0	0.5	0	0
C38	CB29	DW#9		20.886	0.014	0	0	0	0	0.5	0	0
C39	CB27	MH18		54.24	0.014	0	0	0	0	0.5	0	0
C4	MH4	CB101		119.267	0.014	0	0	0	0	0.5	0	0
C40	MH8	MH9		25.283	0.014	0	0	0	0	0.5	0	0
C41	MH9	MH10		23.109	0.014	0	0	0	0	0.5	0	0
C42	MH10	MH18		39.24	0.014	0	0	0	0	0.5	0	0
C43	CB33	MH18		40.72	0.014	0	0	0	0	0.5	0	0
C44	CB28	MH18		27.307	0.014	0	0	0	0	0.5	0	0
C45	MH11	MH18		122.435	0.014	0	0	0	0	0.5	0	0
C46	MH12	MH11		84.66	0.014	0	0	0	0	0.5	0	0
C47	CB31	MH11		13.987	0.014	0	0	0	0	0.5	0	0
C48	CB32	MH11		53.849	0.014	0	0	0	0	0.5	0	0
C49	MH14	MH13		212.01	0.014	0	0	0	0	0.5	0	0
C5	CB101	MH3		43.66	0.014	0	0	0	0	0.5	0	0
C50	MH13	MH12		219.97	0.014	0	0	0	0	0.5	0	0
C51	MH16	MH15		116.201	0.014	0	0	0	0	0.5	0	0
C52	MH15	MH18		432.199	0.014	0	0	0	0	0.5	0	0
C53	MH17	MH16		134.35	0.014	0	0	0	0	0.5	0	0
C54	CB37	CB36		48.25	0.014	0	0	0	0	0.5	0	0
C55	CB38	CB37		20.613	0.014	0	0	0	0	0.5	0	0
C56	CB35	J32		19.765	0.014	0	0	0	0	0.5	0	0
C57	J18	OF-RS-1-N		45.993	0.014	0	0	0	0	0.5	0	0
C58	J22	J23		125.62	0.014	0	0	0	0	0.5	0	0
C59	J11	J13		35.428	0.014	0	0	0	0	0.5	0	0

HELD

Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C6	MH3	MH2	prop	114.494	0.014	0	0	0	0	0.5	0	0
C60	J13	OF-RS-3-N		122.618	0.014	0	0	0	0	0.5	0	0
C61	J5	J8		70.68	0.014	0	0	0	0	0.5	0	0
C62	J8	OF-RS-4-S		67.751	0.014	0	0	0	0	0.5	0	0
C64	J4	J7		70.823	0.014	0	0	0	0	0.5	0	0
C65	J7	OF-RS-5-S		67.331	0.014	0	0	0	0	0.5	0	0
C66	J3	J1		75.518	0.014	0	0	0	0	0.5	0	0
C67	J1	OF-RS-6-N	Zone1	64.921	0.014	0	0	0	0	0.5	0	0
C68	J6	J2		76.875	0.014	0	0	0	0	0.5	0	0
C6814	J445	J611	road	301.421	0.011	0	0	0	0	0	0	0
C6815	J611	J564	road	169.519	0.011	0	0	0	0	0	0	0
C6816	J564	J672	road	29.034	0.011	0	0	0	0	0	0	0
C69	J2	OF-RS-11-N	Zone1	52.784	0.014	0	0	0	0	0.5	0	0
C7	MH2	MH1	prop	190.137	0.014	0	0	0	0	0.5	0	0
C70	J9	J10		77.687	0.014	0	0	0	0	0.5	0	0
C71	J10	OF-RS-10-S	Zone1	69.271	0.014	0	0	0	0	0.5	0	0
C7147	OF-SP-1-WJ	DuckPond	Zone2	20	0.014	0	0	0	0	0.5	0	0.5
C72	J17	J16		75.234	0.014	0	0	0	0	0.5	0	0
C73	J16	OF-RS-9-N	Zone1	53.115	0.014	0	0	0	0	0.5	0	0
C74	J15	J14		75.097	0.014	0	0	0	0	0.5	0	0
C75	J14	OF-RS-8-N	Zone1	60.067	0.014	0	0	0	0	0.5	0	0
C76	J25	J26		70.204	0.014	0	0	0	0	0.5	0	0
C77	J26	OF-RS-7-S	Zone1	74.453	0.014	0	0	0	0	0.5	0	0
C78	J31	J30		52.913	0.014	0	0	0	0	0.5	0	0
C79	J30	OF-RS-13-S	Zone1	50.828	0.014	0	0	0	0	0.5	0	0
C8	MH1	OF-SP-1-WJ	prop	20.094	0.014	0	0	0	0	0.5	0	0

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Table 6A: Conduits (continued...)

Name	Inlet Node	Outlet Node	Tag	Length (ft)	Roughness	Inlet Offset (ft)	Outlet Offset (ft)	Initial Flow (cfs)	Flow Limit (cfs)	Entry Loss Coeff.	Exit Loss Coeff.	Avg. Loss Coeff.
C80	J27	J28		84.437	0.014	0	0	0	0	0.5	0	0
C81_1	J28	J71	prop	208.587	0.014	0	0	0	0	0.5	0	0
C81_2	J71	J32	prop	193.283	0.014	0	0	0	0	0.5	0	0
C82	J29	J28		113.251	0.014	0	0	0	0	0.5	0	0
C83	J32	OF-RS-12-N	Zone1	21.49	0.014	0	0	0	0	0.5	0	0
C9	J12	J20		67.86	0.014	0	0	0	0	0.5	0	0
C90	DMH-25	DMH-26	prop	70.342	0.011	0	0	0	0	0.5	0	0
C92	DMH-28	DMH-30	prop	39.182	0.011	0	0	0	0	0.5	0	0
C97	DMH-15	DMH-17	prop	28.577	0.011	0	0	0	0	0.5	0	0

Table 6B: Conduits

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
_C101	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01976	6.96
_C102	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00579	16.86
_C105	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00673	1.91
_C107	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.008	30.89
C1	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02256	4.04
C10	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03851	5.36
C103	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01113	16.34
C103_1	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.02001	27.81
C105	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.02755	6.96
C107	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00604	7.25
C109	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.025	12.82

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Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C11	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00808	0.03
C111	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.01404	20.4
C115	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.02983	11.91
C12	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00104	0.08
C13	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01956	4.54
C14	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00378	5.78
C141	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.01355	16.27
C1418	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00602	30
C15	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00401	30.89
C155	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00405	6
C16	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00799	0.08
C17	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00418	0.43
C18	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00787	11.97
C19	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00912	10.33
C19_2	0	YES	CIRCULAR	1	0	0	0	1				NO		NO	0.02043	3.14
C2	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00352	3.06
C20	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00418	1.56
C21	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.02847	11.92
C21017	0	NO	RECT_OPEN	30	16.356	2	0	1				NO		NO	0.04938	2.71
C21018	0	NO	RECT_OPEN	30	17.034	2	0	1				NO		NO	0.04684	0.15
C21048	0	NO	RECT_OPEN	30	18.716	2	0	1				NO		NO	0.04087	1.63
C21088	0	NO	RECT_OPEN	30	18.693	2	0	1				NO		NO	0.04092	1.63
C21134	0	NO	RECT_OPEN	30	17.962	2	0	1				NO		NO	0.04812	0.32
C21144	0	NO	RECT_OPEN	30	12.521	2	0	1				NO		NO	0.0484	31.81
C22	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01421	11.98
C22143	0	NO	RECT_OPEN	30	19.848	2	0	1				NO		NO	0.0917	0

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Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C22244	0	NO	RECT_OPEN	30	19.828	2	0	1				NO		NO	0.3487	0
C22267	0	NO	RECT_OPEN	30	17.785	2	0	1				NO		NO	0.31905	0
C22328	0	NO	RECT_OPEN	30	17.222	2	0	1				NO		NO	0.35436	0.03
C22348	0	NO	RECT_OPEN	30	20.207	2	0	1				NO		NO	0.32717	0.01
C23	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00409	22.57
C2314	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00491	1.81
C24	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00203	0
C2406	0	NO	RECT_OPEN	30	20.986	2	0	1				NO		NO	0.11675	0.53
C2414	0	NO	RECT_OPEN	30	23.094	2	0	1				NO		NO	0.10717	1.76
C2454	0	NO	RECT_OPEN	30	20.903	2	0	1				NO		NO	0.17295	2.03
C2489	0	NO	RECT_OPEN	30	17.335	2	0	1				NO		NO	0.19457	13.05
C25	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00973	0
C2547	0	NO	RECT_OPEN	30	20.163	2	0	1				NO		NO	0.15568	0.71
C2549	0	NO	RECT_OPEN	30	19.245	2	0	1				NO		NO	0.14871	0.1
C2592	0	NO	RECT_OPEN	30	15.47	2	0	1				NO		NO	0.05216	0.01
C26	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00225	1.42
C27	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04441	6.78
C28	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00419	26.11
C2988	0	NO	RECT_OPEN	30	19.348	2	0	1				NO		NO	0.05722	4.8
C3	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00464	3.29
C30	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00182	7.61
C31	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00752	6.26
C33	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06664	4.54
C37	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.28829	1.37
C38	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.18151	1.37
C39	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04984	0.55

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Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C4	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01048	4.92
C40	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00435	0.03
C41	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	-0.00606	0.07
C42	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.07513	0.13
C43	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00614	6.81
C44	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00732	0.36
C45	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02206	4.49
C46	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0473	6.49
C47	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06088	0.03
C48	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0039	2.55
C49	0	NO	CIRCULAR	0.833	0	0	0	1				NO		NO	0.03304	1.08
C5	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01145	4.93
C50	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05463	3.55
C51	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0043	2.8
C52	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04563	3.45
C53	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02189	0.71
C54	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00477	4.58
C55	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03009	4.2
C56	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06388	6.26
C57	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03416	1.88
C58	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05181	1.42
C59	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00847	3.26
C6	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00437	4.94
C60	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.01085	7.37
C61	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0099	1.79
C62	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.17455	6.02

Hydro

Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C64	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02401	1.68
C65	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.20909	3.44
C66	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00397	1.35
C67	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.02666	3.26
C68	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00781	6.22
C6814	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00739	28.27
C6815	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00493	49.91
C6816	0	NO	RECT_OPEN	0.5	20	0	0	1				NO		NO	0.00696	50.59
C69	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.05236	6.22
C7	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00447	4.99
C70	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01287	0
C71	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.10685	1.73
C7147	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.03352	9.3
C72	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00798	0.74
C73	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.03523	0.74
C74	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00266	1.37
C75	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04867	1.37
C76	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.0057	2.57
C77	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.06663	6.75
C78	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00567	2.66
C79	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.01338	8.52
C8	0	NO	CIRCULAR	1.5	0	0	0	1				NO		NO	0.00299	9.3
C80	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	-0.00213	8.94
C81_1	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.01911	17.47
C81_2	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.01912	17.47
C82	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00327	6.5

Hydro

Table 6B: Conduits (continued...)

Name	Seepage Rate (in/hr)	Flap Gate	Cross-Section	Geom1 (ft)	Geom2 (ft)	Geom3	Geom4	Barrels	Transect	Shape Curve	Culvert Code	Control Rules	Street	Inlets	Slope (ft/ft)	Max. |Flow| (cfs)
C83	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.04658	23.73
C9	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00737	3.43
C90	0	NO	CIRCULAR	1	0	0	0	1				NO		NO	0.00739	0.15
C92	0	NO	CIRCULAR	1.25	0	0	0	1				NO		NO	0.00766	5.64
C97	0	NO	CIRCULAR	2	0	0	0	1				NO		NO	0.00525	30.89

Table 6C: Conduits

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft^3)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
_C101	10/31/2018 12:05 PM	2.23	0.19	1	0			1	0	0	0	0
_C102	10/31/2018 11:54 AM	6.07	0.83	1	0			1	0	0	0	0
_C105	10/31/2018 11:55 AM	2.43	0.55	1	0			1	0	0	0	0
_C107	10/31/2018 12:07 PM	9.93	1.29	0.97	0			1	0	0	0	0
C1	10/31/2018 12:20 PM	5.14	0.81	1	0			1	0	0	0	0
C10	10/31/2018 12:05 PM	7.56	0.83	0.85	0			1	0	0	0	0
C103	10/31/2018 11:51 AM	6.74	0.58	1	0			1	0	0	0	0
C103_1	10/31/2018 12:07 PM	8.85	0.74	1	0			1	0	0	0	0
C105	10/31/2018 12:05 PM	2.21	0.14	1	0			1	0	0	0	0
C107	10/31/2018 12:05 PM	4.1	0.75	1	0			1	0	0	0	0
C109	10/31/2018 12:15 PM	10.44	1.06	1	0			1	0	0	0	0
C11	10/31/2018 12:07 PM	0.05	0.01	0.95	0			1	0	0	0	0
C111	10/31/2018 12:20 PM	4.28	0.21	0.48	0			1	0	0	0	0
C115	10/31/2018 12:07 PM	8.11	0.56	1	0			1	0	0	0	0
C12	10/31/2018 12:07 PM	0.11	0.07	1	0			1	0	0	0	0

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Proposal No. 608744-136412

Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C13	10/31/2018 12:05 PM	5.81	0.98	0.98	0			1	0	0	0	0
C14	10/31/2018 11:55 AM	4.71	1.23	1	0			1	0	0	0	0
C141	10/31/2018 11:51 AM	8.43	0.52	1	0			1	0	0	0	0
C1418	10/31/2018 12:07 PM	9.55	1.45	1	0			1	0	0	0	0
C15	10/31/2018 12:07 PM	9.83	1.82	1	0			1	0	0	0	0
C155	10/31/2018 12:05 PM	4.89	1.24	1	0			1	0	0	0	0
C16	10/31/2018 12:00 PM	0.1	0.02	1	0			1	0	0	0	0
C17	10/31/2018 11:47 AM	0.38	0.09	1	0			1	0	0	0	0
C18	10/31/2018 12:05 PM	6.78	1.09	1	0			1	0	0	0	0
C19	10/31/2018 11:38 AM	9.4	0.87	0.61	0			1	0	0	0	0
C19_2	10/31/2018 12:09 PM	4	0.52	1	0			1	0	0	0	0
C2	10/31/2018 15:15 PM	3.89	1.56	1	0			1	0	0	0	0
C20	10/31/2018 12:00 PM	2.45	0.57	1	0			1	0	0	0	0
C21	10/31/2018 12:05 PM	10.84	0.57	0.79	0			1	0	0	0	0
C21017	10/31/2018 12:08 PM	0.37	0	0.02	0			1	0	0	0	0
C21018	10/31/2018 12:09 PM	0.02	0	0.01	0			1	0	0	0	0
C21048	10/31/2018 12:09 PM	0.21	0	0.01	0			1	0	0	0	0
C21088	10/31/2018 12:09 PM	0.16	0	0.02	0			1	0	0	0	0
C21134	10/31/2018 12:08 PM	0.03	0	0.02	0			1	0	0	0	0
C21144	10/31/2018 12:08 PM	3.91	0	0.02	0			1	0	0	0	0
C22	10/31/2018 12:07 PM	6.78	0.81	1	0			1	0	0	0	0
C22143	10/31/2018 18:46 PM	0	0	0	0			1	0	0	0	0
C22244	10/31/2018 12:39 PM	0	0	0.03	0			1	0	0	0	0
C22267	10/31/2018 12:39 PM	0	0	0	0			1	0	0	0	0
C22328	10/31/2018 12:11 PM	0.07	0	0	0			1	0	0	0	0
C22348	10/31/2018 12:11 PM	0.02	0	0	0			1	0	0	0	0

Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C23	10/31/2018 12:05 PM	7.19	1.32	1	0			1	0	0	0	0
C2314	10/31/2018 12:00 PM	2.62	0.61	1	0			1	0	0	0	0
C24	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C2406	10/31/2018 12:06 PM	0.35	0	0.03	0			1	0	0	0	0
C2414	10/31/2018 12:05 PM	0.72	0	0.03	0			1	0	0	0	0
C2454	10/31/2018 12:05 PM	0.11	0	0.06	0			1	0	0	0	0
C2489	10/31/2018 12:05 PM	0.84	0	0.06	0			1	0	0	0	0
C25	10/31/2018 00:00 AM	0	0	0	0			1	0	0	0	0
C2547	10/31/2018 12:06 PM	0.04	0	0.06	0			1	0	0	0	0
C2549	10/31/2018 12:07 PM	0.01	0	0.06	0			1	0	0	0	0
C2592	10/31/2018 12:13 PM	0.04	0	0.01	0			1	0	0	0	0
C26	10/31/2018 12:06 PM	3.08	0.71	0.57	0			1	0	0	0	0
C27	10/31/2018 12:05 PM	9.12	0.97	0.9	0			1	0	0	0	0
C28	10/31/2018 12:05 PM	8.49	1.51	0.95	0			1	0	0	0	0
C2988	10/31/2018 12:07 PM	0.55	0	0.02	0			1	0	0	0	0
C3	10/31/2018 13:31 PM	4.19	1.46	1	0			1	0	0	0	0
C30	10/31/2018 12:04 PM	4.47	1.44	1	0			1	0	0	0	0
C31	10/31/2018 12:05 PM	7.97	2.18	1	0			1	0	0	0	0
C33	10/31/2018 12:05 PM	5.81	0.42	0.98	0			1	0	0	0	0
C37	10/31/2018 12:05 PM	1.74	0.08	1	0			1	0	0	0	0
C38	10/31/2018 12:05 PM	1.74	0.1	1	0			1	0	0	0	0
C39	10/31/2018 12:05 PM	0.7	0.07	1	0			1	0	0	0	0
C4	10/31/2018 12:22 PM	6.27	1.45	1	0			1	0	0	0	0
C40	10/31/2018 12:05 PM	0.21	0.01	1	0			1	0	0	0	0
C41	10/31/2018 12:24 PM	0.69	0.03	1	0			1	0	0	0	0
C42	10/31/2018 11:55 AM	0.23	0.01	1	0			1	0	0	0	0

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Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C43	10/31/2018 11:38 AM	8.68	2.63	1	0			1	0	0	0	0
C44	10/31/2018 12:05 PM	0.45	0.13	1	0			1	0	0	0	0
C45	10/31/2018 11:55 AM	5.72	0.91	1	0			1	0	0	0	0
C46	10/31/2018 12:05 PM	8.26	0.9	1	0			1	0	0	0	0
C47	10/31/2018 11:47 AM	0.07	0	1	0			1	0	0	0	0
C48	10/31/2018 12:05 PM	3.25	1.24	1	0			1	0	0	0	0
C49	10/31/2018 12:05 PM	4.27	0.29	0.47	0			1	0	0	0	0
C5	10/31/2018 12:21 PM	6.27	1.39	1	0			1	0	0	0	0
C50	10/31/2018 12:05 PM	5.74	0.46	0.74	0			1	0	0	0	0
C51	10/31/2018 12:05 PM	4.6	1.29	0.75	0			1	0	0	0	0
C52	10/31/2018 12:05 PM	5.49	0.49	0.75	0			1	0	0	0	0
C53	10/31/2018 12:05 PM	1.42	0.15	0.63	0			1	0	0	0	0
C54	10/31/2018 12:05 PM	5.83	2.01	1	0			1	0	0	0	0
C55	10/31/2018 12:05 PM	5.35	0.73	1	0			1	0	0	0	0
C56	10/31/2018 12:05 PM	7.97	0.75	1	0			1	0	0	0	0
C57	10/31/2018 12:05 PM	6.56	0.31	0.39	0			1	0	0	0	0
C58	10/31/2018 12:05 PM	2.65	0.19	0.65	0			1	0	0	0	0
C59	10/31/2018 12:05 PM	4.15	1.07	1	0			1	0	0	0	0
C6	10/31/2018 12:20 PM	4.02	1.25	1	0			1	0	0	0	0
C60	10/31/2018 12:05 PM	6.03	0.73	0.65	0			1	0	0	0	0
C61	10/31/2018 12:05 PM	4.3	0.54	0.52	0			1	0	0	0	0
C62	10/31/2018 12:05 PM	16.26	0.44	0.48	0			1	0	0	0	0
C64	10/31/2018 12:05 PM	6.15	0.33	0.38	0			1	0	0	0	0
C65	10/31/2018 12:05 PM	15.09	0.23	0.33	0			1	0	0	0	0
C66	10/31/2018 12:05 PM	2.68	0.65	0.61	0			1	0	0	0	0
C67	10/31/2018 12:05 PM	6.88	0.6	0.58	0			1	0	0	0	0

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Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C68	10/31/2018 12:05 PM	8.42	2.13	0.89	0			1	0	0	0	0
C6814	10/31/2018 12:16 PM	3.85	0.4	0.74	0			1	0	0	0	0
C6815	10/31/2018 12:15 PM	5.73	0.86	0.87	0			1	0	0	0	0
C6816	10/31/2018 12:15 PM	7.47	0.74	0.68	0			1	0	0	0	0
C69	10/31/2018 12:05 PM	10.02	0.82	0.74	0			1	0	0	0	0
C7	10/31/2018 12:15 PM	4.2	1.24	1	0			1	0	0	0	0
C70	10/31/2018 00:00 AM	0	0	0.14	0			1	0	0	0	0
C71	10/31/2018 12:05 PM	9.85	0.16	0.28	0			1	0	0	0	0
C7147	10/31/2018 12:05 PM	13.28	0.52	0.45	0			1	0	0	0	0
C72	10/31/2018 12:05 PM	3.76	0.25	0.3	0			1	0	0	0	0
C73	10/31/2018 12:05 PM	5.19	0.12	0.24	0			1	0	0	0	0
C74	10/31/2018 12:05 PM	4.02	0.8	0.45	0			1	0	0	0	0
C75	10/31/2018 12:05 PM	6.93	0.19	0.3	0			1	0	0	0	0
C76	10/31/2018 12:05 PM	4.08	1.03	0.75	0			1	0	0	0	0
C77	10/31/2018 12:15 PM	11.43	0.79	0.7	0			1	0	0	0	0
C78	10/31/2018 11:59 AM	3.39	1.07	1	0			1	0	0	0	0
C79	10/31/2018 12:05 PM	10.85	2.23	1	0			1	0	0	0	0
C8	10/31/2018 12:05 PM	5.95	1.75	0.83	0			1	0	0	0	0
C80	10/31/2018 12:05 PM	11.39	5.85	1	0			1	0	0	0	0
C81_1	10/31/2018 12:05 PM	14.24	2.11	1	0			1	0	0	0	0
C81_2	10/31/2018 12:05 PM	14.24	2.11	1	0			1	0	0	0	0
C82	10/31/2018 12:05 PM	8.27	3.44	1	0			1	0	0	0	0
C83	10/31/2018 12:05 PM	30.21	3.32	1	0			1	0	0	0	0
C9	10/31/2018 12:05 PM	4.84	1.21	0.85	0			1	0	0	0	0
C90	10/31/2018 11:47 AM	0.32	0.04	1	0			1	0	0	0	0
C92	10/31/2018 11:50 AM	4.6	0.84	1	0			1	0	0	0	0

HELD

Table 6C: Conduits (continued...)

Name	Time Max. Flow (M/D/Y)	Max. |Velocity| (ft/s)	Max/Full Flow	Max/Full Depth	Max. Volume (ft³)	Inlet Structure	Capture Node	Number of Inlets	Percent Clogged	Flow Restriction (cfs)	Depression Height (ft)	Depression Width (ft)
C97	10/31/2018 12:07 PM	9.83	1.59	1	0			1	0	0	0	0

Table 6D: Conduits

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
_C101	AUTOMATIC	2.52	2.52	2.54	0.01	0.01	1	0.25	0.05	0	0	0
_C102	AUTOMATIC	2.68	2.68	2.7	0.01	0.17	1	0.07	0.56	0.34	0	0
_C105	AUTOMATIC	2.66	2.66	2.73	0.01	0.01	1	0.27	0.09	0	0.7	0
_C107	AUTOMATIC	0.01	0.35	0.01	0.32	0.01	1	0.03	0.59	0.06	0	0
C1	AUTOMATIC	2.38	2.38	4.9	0.01	0.01	1	0.14	0.13	0.15	0.2	0
C10	AUTOMATIC	0.01	0.01	0.1	0.01	0.01	1	0.02	0	0.48	0.9	0
C103	AUTOMATIC	2.69	2.7	2.7	0.01	0.04	1	0.05	0.55	0.36	0.55	0
C103_1	AUTOMATIC	0.33	0.33	0.51	0.01	0.01	1	0.05	0.52	0.41	0.93	0
C105	AUTOMATIC	2.66	2.66	2.7	0.01	0.01	1	0.09	0.06	0	0.7	0
C107	AUTOMATIC	2.68	2.68	2.75	0.01	0.01	1	0.1	0.7	0.03	0.64	0
C109	AUTOMATIC	0.29	0.29	0.41	0.13	0.2	1	0.07	0.49	0.43	0.89	0
C11	AUTOMATIC	0.01	0.01	0.05	0.01	0.01	1	0.62	0.03	0	0.74	0
C111	AUTOMATIC	0	0	0	0	0	1	0.83	0.05	0.02	0.75	0
C115	AUTOMATIC	0.19	0.19	0.47	0.01	0.01	1	0.52	0.01	0.47	0.81	0
C12	AUTOMATIC	0.05	0.05	0.07	0.01	0.01	1	0.09	0.38	0	0.5	0
C13	AUTOMATIC	0.01	0.07	0.01	0.01	0.01	1	0.09	0.5	0.41	0	0
C14	AUTOMATIC	36.13	36.26	36.13	0.4	0.27	1	0.03	0.97	0	0.13	0
C141	AUTOMATIC	2.7	2.7	2.71	0.01	0.01	1	0.05	0.06	0	0	0
C1418	AUTOMATIC	0.49	0.51	0.49	0.4	0.49	1	0.06	0.14	0.34	0.55	0

Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C15	AUTOMATIC	0.43	0.49	0.43	0.51	0.43	1	0.03	0.63	0.31	0.09	0
C155	AUTOMATIC	0.89	0.89	36.26	0.6	0.64	1	0.04	0.9	0	0.16	0
C16	AUTOMATIC	0.71	0.71	1.05	0.01	0.01	1	0.03	0.79	0.02	0.22	0
C17	AUTOMATIC	0.69	0.69	0.89	0.01	0.01	1	0.1	0.76	0	0	0
C18	AUTOMATIC	0.99	0.99	38.04	0.49	0.58	1	0.01	0.87	0.12	0.86	0
C19	AUTOMATIC	0	0	0	0	0	1	0.31	0.18	0.16	0.75	0
C19_2	AUTOMATIC	10.3	10.3	35.99	0.01	0.01	1	0.24	0.76	0	0.01	0
C2	AUTOMATIC	4.16	5.09	4.16	5.31	4.16	1	0.05	0.09	0	0	0
C20	AUTOMATIC	10.31	10.31	10.63	0.01	0.01	1	0.02	0.98	0	0.48	0
C21	AUTOMATIC	0.01	0.01	0.19	0.01	0.01	1	0.31	0.22	0.47	0.63	0
C21017	AUTOMATIC	0	0	0	0	0	1	0.24	0.75	0	0.75	0
C21018	AUTOMATIC	0	0	0	0	0	1	0.24	0	0	0.75	0
C21048	AUTOMATIC	0	0	0	0	0	1	0.24	0	0	0.75	0
C21088	AUTOMATIC	0	0	0	0	0	1	0.23	0	0	0.75	0
C21134	AUTOMATIC	0	0	0	0	0	1	0.23	0	0	0.75	0
C21144	AUTOMATIC	0	0	0	0	0	1	0.23	0.76	0	0.76	0
C22	AUTOMATIC	0.47	0.47	0.83	0.01	0.01	1	0.52	0.25	0.23	0.81	0
C22143	AUTOMATIC	0	0	0	0	0	1	0.25	0.34	0	0.74	0
C22244	AUTOMATIC	0	0	0	0	0	1	0.16	0.22	0	0.74	0
C22267	AUTOMATIC	0	0	0	0	0	1	0.25	0.22	0	0.74	0
C22328	AUTOMATIC	0	0	0	0	0	1	0.25	0.74	0	0.75	0
C22348	AUTOMATIC	0	0	0	0	0	1	0.25	0.74	0	0.74	0
C23	AUTOMATIC	0.3	0.36	0.3	0.33	0.3	1	0.04	0.46	0.02	0.76	0
C2314	AUTOMATIC	10.63	10.63	10.76	0.01	0.16	1	0.02	0.29	0	0	0
C24	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C2406	AUTOMATIC	0	0	0	0	0	1	0.09	0.03	0	0.76	0

Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C2414	AUTOMATIC	0	0	0	0	0	1	0.09	0.91	0	0.75	0
C2454	AUTOMATIC	0	0	0	0	0	1	0.08	0.91	0	0.91	0
C2489	AUTOMATIC	0	0	0	0	0	1	0.08	0.91	0	0.91	0
C25	AUTOMATIC	0	0	0	0	0	1	1	0	0	0	0
C2547	AUTOMATIC	0	0	0	0	0	1	0.05	0.91	0	0.91	0
C2549	AUTOMATIC	0	0	0	0	0	1	0.05	0.88	0	0.9	0
C2592	AUTOMATIC	0	0	0	0	0	1	0.25	0.71	0.01	0.75	0
C26	AUTOMATIC	0	0	0	0	0	1	0.83	0	0	0	0
C27	AUTOMATIC	0.01	0.1	0.01	0.01	0.01	1	0.02	0.49	0.48	0	0
C28	AUTOMATIC	0.01	0.3	0.01	0.43	0.01	1	0.04	0	0	0	0
C2988	AUTOMATIC	0	0	0	0	0	1	0.24	0.75	0	0.75	0
C3	AUTOMATIC	4.23	4.53	4.23	4.08	3.48	1	0.11	0.8	0	0.44	0
C30	AUTOMATIC	35.98	36.04	35.98	0.55	0.4	1	0.03	0.92	0.04	0.07	0
C31	AUTOMATIC	0.61	0.61	0.61	0.46	0.54	1	0.19	0.51	0.3	0.01	0
C33	AUTOMATIC	0.01	0.01	0.86	0.01	0.01	1	0.09	0.38	0.03	0.88	0
C37	AUTOMATIC	44.46	44.46	46.11	0.01	0.01	1	0.02	0.98	0.01	0.05	0
C38	AUTOMATIC	44.6	44.6	46.11	0.01	0.01	1	0.02	0.98	0	0.04	0
C39	AUTOMATIC	0.32	0.32	1.11	0.01	0.01	1	0.01	0.99	0	0.97	0
C4	AUTOMATIC	4.13	4.23	4.13	4.13	4.13	1	0.11	0.6	0.29	0.44	0
C40	AUTOMATIC	0.19	0.19	0.27	0.01	0.01	1	0.08	0.92	0	0.01	0
C41	AUTOMATIC	0.17	0.17	0.27	0.01	0.01	1	0.08	0.9	0	0.07	0
C42	AUTOMATIC	0.17	0.17	1.11	0.01	0.01	1	0.01	0.9	0	0.89	0
C43	AUTOMATIC	1.11	1.74	1.11	2.61	1.11	1	0.01	0.13	0.83	0.03	0
C44	AUTOMATIC	1.05	1.05	1.11	0.01	0.01	1	0.01	0.99	0	0.12	0
C45	AUTOMATIC	0.7	0.7	1.11	0.01	0.01	1	0.01	0.5	0.01	0.96	0
C46	AUTOMATIC	0.28	0.28	0.7	0.01	0.01	1	0.49	0.02	0.48	0.98	0

Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C47	AUTOMATIC	0.58	0.58	0.7	0.01	0.01	1	0.49	0.02	0	0.74	0
C48	AUTOMATIC	0.67	0.67	0.7	0.17	0.22	1	0.49	0.43	0	0.87	0
C49	AUTOMATIC	0	0	0	0	0	1	0.01	0.61	0.33	0.94	0
C5	AUTOMATIC	3.77	4.13	3.77	3.9	3.77	1	0.11	0.74	0.15	0.56	0
C50	AUTOMATIC	0.01	0.01	0.28	0.01	0.01	1	0.01	0.5	0.49	0.98	0
C51	AUTOMATIC	0.01	0.06	0.01	0.2	0.01	1	0.47	0.04	0.46	0.49	0
C52	AUTOMATIC	0.01	0.01	1.11	0.01	0.01	1	0.01	0.52	0	0.99	0
C53	AUTOMATIC	0.01	0.01	0.06	0.01	0.01	1	0.5	0.49	0	0.99	0
C54	AUTOMATIC	0.6	0.6	0.61	0.42	0.48	1	0.19	0.31	0	0.53	0
C55	AUTOMATIC	0.55	0.55	0.6	0.01	0.01	1	0.69	0.03	0.28	0.73	0
C56	AUTOMATIC	0.61	0.61	0.73	0.01	0.01	1	0.15	0.06	0.26	0.8	0
C57	AUTOMATIC	0	0	0	0	0	1	0.09	0.49	0.42	0	0
C58	AUTOMATIC	0.01	0.01	0.1	0.01	0.01	1	0.02	0.42	0	0.91	0
C59	AUTOMATIC	0.02	0.09	0.02	0.06	0.02	1	0.12	0.38	0	0.78	0
C6	AUTOMATIC	0.95	1.24	0.95	2.27	0.95	1	0.11	0.89	0	0.49	0
C60	AUTOMATIC	0	0	0	0	0	1	0.12	0.5	0.38	0	0
C61	AUTOMATIC	0	0	0	0	0	1	0.16	0.01	0.25	0.5	0
C62	AUTOMATIC	0	0	0	0	0	1	0.16	0.49	0.35	0	0
C64	AUTOMATIC	0	0	0	0	0	1	0.11	0.5	0.38	0.51	0
C65	AUTOMATIC	0	0	0	0	0	1	0.11	0.5	0.39	0.01	0
C66	AUTOMATIC	0	0	0	0	0	1	0.13	0.87	0	0.69	0
C67	AUTOMATIC	0	0	0	0	0	1	0.13	0.49	0.38	0	0
C68	AUTOMATIC	0.01	0.43	0.01	0.5	0.01	1	0.18	0.5	0.32	0.49	0
C6814	AUTOMATIC	0	0	0	0	0	1	0.57	0.15	0.02	0.76	0
C6815	AUTOMATIC	0	0	0	0	0	1	0.52	0.23	0.21	0.51	0
C6816	AUTOMATIC	0	0	0	0	0	1	0.14	0.2	0.26	0.72	0

Table 6D: Conduits (continued...)

Name	Inlet Placement	Full Both Ends (h)	Full Upstream (h)	Full Downstream (h)	Above Full Normal (h)	Capacity Limited (h)	Length Factor (fraction)	Dry (fraction)	Subcritical (fraction)	Supercritical (fraction)	Normal Limited (fraction)	Inlet Control (fraction)
C69	AUTOMATIC	0	0	0	0	0	1	0.18	0.49	0.33	0	0
C7	AUTOMATIC	0.25	0.95	0.25	2.14	0.25	1	0.09	0.5	0	0.6	0
C70	AUTOMATIC	0	0	0	0	0	1	0.16	0	0	0	0
C71	AUTOMATIC	0	0	0	0	0	1	0.16	0.5	0.35	0	0
C7147	AUTOMATIC	0	0	0	0	0	1	0.09	0.66	0.24	0	0
C72	AUTOMATIC	0	0	0	0	0	1	0.06	0.53	0.41	0.5	0
C73	AUTOMATIC	0	0	0	0	0	1	0.07	0.5	0.44	0	0
C74	AUTOMATIC	0	0	0	0	0	1	0.04	0.83	0.13	0.49	0
C75	AUTOMATIC	0	0	0	0	0	1	0.05	0.49	0.46	0	0
C76	AUTOMATIC	0.01	0.01	0.01	0.02	0.01	1	0.16	0.32	0.01	0.79	0
C77	AUTOMATIC	0	0	0	0	0	1	0.16	0.47	0.37	0	0
C78	AUTOMATIC	0.62	0.62	0.67	0.02	0.07	1	0.06	0.36	0	0.81	0
C79	AUTOMATIC	0.4	0.67	0.4	0.68	0.4	1	0.06	0.51	0.44	0	0
C8	AUTOMATIC	0.01	0.01	0.01	0.98	0.01	1	0.09	0.6	0.31	0	0
C80	AUTOMATIC	0.53	0.53	1	1.1	0.01	1	0.05	0.85	0	0.02	0
C81_1	AUTOMATIC	0.51	0.51	0.56	0.45	0.46	1	0.15	0.51	0.34	0.53	0
C81_2	AUTOMATIC	0.56	0.56	0.69	0.45	0.46	1	0.15	0.03	0.34	0.76	0
C82	AUTOMATIC	0.53	0.62	0.53	0.71	0.53	1	0.15	0.33	0.03	0.69	0
C83	AUTOMATIC	0.67	0.73	0.67	0.67	0.67	1	0.15	0.49	0.36	0	0
C9	AUTOMATIC	0.01	0.04	0.01	0.15	0.01	1	0.02	0.63	0.35	0.5	0
C90	AUTOMATIC	0.62	0.62	0.77	0.01	0.01	1	0.24	0.28	0	0.49	0
C92	AUTOMATIC	36.26	36.26	36.26	0.01	0.35	1	0.03	0.83	0.13	0.07	0
C97	AUTOMATIC	0.35	0.43	0.35	0.44	0.35	1	0.03	0.57	0.39	0.52	0

Table 6E: Conduits

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
_C101	0	0		0	0	0	0	0	0	0	0	0
_C102	0	0		0	0	0	0	0	0	0	0	0
_C105	0	0		0	0	0	0	0	0	0	0	0
_C107	0	0		0	0	0	0	0	0	0	0	0
C1	0	0		0	0	0	0	0	0	0	0	0
C10	0	0		0	0	0	0	0	0	0	0	0
C103	0	0		0	0	0	0	0	0	0	0	0
C103_1	0	0		0	0	0	0	0	0	0	0	0
C105	0	0		0	0	0	0	0	0	0	0	0
C107	0	0		0	0	0	0	0	0	0	0	0
C109	0	0		0	0	0	0	0	0	0	0	0
C11	0	0		0	0	0	0	0	0	0	0	0
C111	0	0		0	0	0	0	0	0	0	0	0
C115	0	0		0	0	0	0	0	0	0	0	0
C12	0	0		0	0	0	0	0	0	0	0	0
C13	0	0		0	0	0	0	0	0	0	0	0
C14	0	0		0	0	0	0	0	0	0	0	0
C141	0	0		0	0	0	0	0	0	0	0	0
C1418	0	0		0	0	0	0	0	0	0	0	0
C15	0	0		0	0	0	0	0	0	0	0	0
C155	0	0		0	0	0	0	0	0	0	0	0
C16	0	0		0	0	0	0	0	0	0	0	0
C17	0	0		0	0	0	0	0	0	0	0	0
C18	0	0		0	0	0	0	0	0	0	0	0
C19	0	0		0	0	0	0	0	0	0	0	0
C19_2	0	0		0	0	0	0	0	0	0	0	0

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Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C2	0	0		0	0	0	0	0	0	0	0	0
C20	0	0		0	0	0	0	0	0	0	0	0
C21	0	0		0	0	0	0	0	0	0	0	0
C21017	0	0		0	0	0	0	0	0	0	0	0
C21018	0	0		0	0	0	0	0	0	0	0	0
C21048	0	0		0	0	0	0	0	0	0	0	0
C21088	0	0		0	0	0	0	0	0	0	0	0
C21134	0	0		0	0	0	0	0	0	0	0	0
C21144	0	0		0	0	0	0	0	0	0	0	0
C22	0	0		0	0	0	0	0	0	0	0	0
C22143	0	0		0	0	0	0	0	0	0	0	0
C22244	0	0		0	0	0	0	0	0	0	0	0
C22267	0	0		0	0	0	0	0	0	0	0	0
C22328	0	0		0	0	0	0	0	0	0	0	0
C22348	0	0		0	0	0	0	0	0	0	0	0
C23	0	0		0	0	0	0	0	0	0	0	0
C2314	0	0		0	0	0	0	0	0	0	0	0
C24	0	0		0	0	0	0	0	0	0	0	0
C2406	0	0		0	0	0	0	0	0	0	0	0
C2414	0	0		0	0	0	0	0	0	0	0	0
C2454	0	0		0	0	0	0	0	0	0	0	0
C2489	0	0		0	0	0	0	0	0	0	0	0
C25	0	0		0	0	0	0	0	0	0	0	0
C2547	0	0		0	0	0	0	0	0	0	0	0
C2549	0	0		0	0	0	0	0	0	0	0	0
C2592	0	0		0	0	0	0	0	0	0	0	0

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Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C26	0	0		0	0	0	0	0	0	0	0	0
C27	0	0		0	0	0	0	0	0	0	0	0
C28	0	0		0	0	0	0	0	0	0	0	0
C2988	0	0		0	0	0	0	0	0	0	0	0
C3	0	0		0	0	0	0	0	0	0	0	0
C30	0	0		0	0	0	0	0	0	0	0	0
C31	0	0		0	0	0	0	0	0	0	0	0
C33	0	0		0	0	0	0	0	0	0	0	0
C37	0	0		0	0	0	0	0	0	0	0	0
C38	0	0		0	0	0	0	0	0	0	0	0
C39	0	0		0	0	0	0	0	0	0	0	0
C4	0	0		0	0	0	0	0	0	0	0	0
C40	0	0		0	0	0	0	0	0	0	0	0
C41	0	0		0	0	0	0	0	0	0	0	0
C42	0	0		0	0	0	0	0	0	0	0	0
C43	0	0		0	0	0	0	0	0	0	0	0
C44	0	0		0	0	0	0	0	0	0	0	0
C45	0	0		0	0	0	0	0	0	0	0	0
C46	0	0		0	0	0	0	0	0	0	0	0
C47	0	0		0	0	0	0	0	0	0	0	0
C48	0	0		0	0	0	0	0	0	0	0	0
C49	0	0		0	0	0	0	0	0	0	0	0
C5	0	0		0	0	0	0	0	0	0	0	0
C50	0	0		0	0	0	0	0	0	0	0	0
C51	0	0		0	0	0	0	0	0	0	0	0
C52	0	0		0	0	0	0	0	0	0	0	0

Hold

Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C53	0	0		0	0	0	0	0	0	0	0	0
C54	0	0		0	0	0	0	0	0	0	0	0
C55	0	0		0	0	0	0	0	0	0	0	0
C56	0	0		0	0	0	0	0	0	0	0	0
C57	0	0		0	0	0	0	0	0	0	0	0
C58	0	0		0	0	0	0	0	0	0	0	0
C59	0	0		0	0	0	0	0	0	0	0	0
C6	0	0		0	0	0	0	0	0	0	0	0
C60	0	0		0	0	0	0	0	0	0	0	0
C61	0	0		0	0	0	0	0	0	0	0	0
C62	0	0		0	0	0	0	0	0	0	0	0
C64	0	0		0	0	0	0	0	0	0	0	0
C65	0	0		0	0	0	0	0	0	0	0	0
C66	0	0		0	0	0	0	0	0	0	0	0
C67	0	0		0	0	0	0	0	0	0	0	0
C68	0	0		0	0	0	0	0	0	0	0	0
C6814	0	0		0	0	0	0	0	0	0	0	0
C6815	0	0		0	0	0	0	0	0	0	0	0
C6816	0	0		0	0	0	0	0	0	0	0	0
C69	0	0		0	0	0	0	0	0	0	0	0
C7	0	0		0	0	0	0	0	0	0	0	0
C70	0	0		0	0	0	0	0	0	0	0	0
C71	0	0		0	0	0	0	0	0	0	0	0
C7147	0	0		0	0	0	0	0	0	0	0	0
C72	0	0		0	0	0	0	0	0	0	0	0
C73	0	0		0	0	0	0	0	0	0	0	0

Hold

Table 6E: Conduits (continued...)

Name	Maximum Spread (ft)	Maximum Depth (ft)	Inlet Location	Peak Flow Capture (%)	Average Capture (%)	Bypass Frequency (%)	Back Flow Frequency (%)	Peak Capture/Inlet	Peak Bypass Flow	Max. Spread (ft)	Contributing Area (ac)	Contributing Imp. Area (ac)
C74	0	0		0	0	0	0	0	0	0	0	0
C75	0	0		0	0	0	0	0	0	0	0	0
C76	0	0		0	0	0	0	0	0	0	0	0
C77	0	0		0	0	0	0	0	0	0	0	0
C78	0	0		0	0	0	0	0	0	0	0	0
C79	0	0		0	0	0	0	0	0	0	0	0
C8	0	0		0	0	0	0	0	0	0	0	0
C80	0	0		0	0	0	0	0	0	0	0	0
C81_1	0	0		0	0	0	0	0	0	0	0	0
C81_2	0	0		0	0	0	0	0	0	0	0	0
C82	0	0		0	0	0	0	0	0	0	0	0
C83	0	0		0	0	0	0	0	0	0	0	0
C9	0	0		0	0	0	0	0	0	0	0	0
C90	0	0		0	0	0	0	0	0	0	0	0
C92	0	0		0	0	0	0	0	0	0	0	0
C97	0	0		0	0	0	0	0	0	0	0	0

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Table 6F: Conduits

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
_C101	0	11.111	0	1
_C102	0	23.687	0	1
_C105	0	44.375	0	1
_C107	0	16.672	0	1
C1	0	80.286	0	1
C10	0	63.364	0	1
C103	0	4.382	0	1
C103_1	0	50.893	0	1
C105	0	8.964	0	1
C107	0	29.248	0	1
C109	0	80.984	0	1
C11	0	8.687	0	1
C111	0	80.426	0	1
C115	0	21.474	0	1
C12	0	14.69	0	1
C13	0	7.798	0	1
C14	0	66.141	0	1
C141	0	5.175	0	1
C1418	0	17.711	0	1
C15	0	34.942	0	1
C155	0	66.234	0	1
C16	0	14.904	0	1
C17	0	32.839	0	1
C18	0	147.118	0	1
C19	0	30.413	0	1
C19_2	0	9.938	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C2	0	143.639	0	1
C20	0	7.292	0	1
C21	0	61.898	0	1
C21017	0	8.808	0	1
C21018	0	11.283	0	1
C21048	0	13.528	0	1
C21088	0	16.208	0	1
C21134	0	11.719	0	1
C21144	0	7.334	0	1
C22	0	23.59	0	1
C22143	0	10.526	0	1
C22244	0	16.784	0	1
C22267	0	10.634	0	1
C22328	0	9.908	0	1
C22348	0	15.24	0	1
C23	0	29.838	0	1
C2314	0	2.493	0	1
C24	0	30.019	0	1
C2406	0	15.06	0	1
C2414	0	15.24	0	1
C2454	0	15.241	0	1
C2489	0	11.883	0	1
C25	0	15.666	0	1
C2547	0	12.739	0	1
C2549	0	12.941	0	1
C2592	0	8.842	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C26	0	54.176	0	1
C27	0	5.088	0	1
C28	0	29.138	0	1
C2988	0	14.82	0	1
C3	0	75.585	0	1
C30	0	13.372	0	1
C31	0	9.725	0	1
C33	0	3.894	0	1
C37	0	4.651	0	1
C38	0	6.346	0	1
C39	0	16.539	0	1
C4	0	36.353	0	1
C40	0	7.713	0	1
C41	0	7.051	0	1
C42	0	11.966	0	1
C43	0	12.41	0	1
C44	0	8.317	0	1
C45	0	37.311	0	1
C46	0	25.797	0	1
C47	0	4.255	0	1
C48	0	16.408	0	1
C49	0	64.613	0	1
C5	0	13.308	0	1
C50	0	67.039	0	1
C51	0	35.426	0	1
C52	0	131.742	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C53	0	40.957	0	1
C54	0	14.707	0	1
C55	0	6.283	0	1
C56	0	6.024	0	1
C57	0	18.673	0	1
C58	0	38.297	0	1
C59	0	10.812	0	1
C6	0	34.898	0	1
C60	0	37.396	0	1
C61	0	21.536	0	1
C62	0	20.62	0	1
C64	0	21.578	0	1
C65	0	20.515	0	1
C66	0	23.027	0	1
C67	0	19.796	0	1
C68	0	23.439	0	1
C6814	0	91.879	0	1
C6815	0	51.67	0	1
C6816	0	8.85	0	1
C69	0	16.096	0	1
C7	0	57.954	0	1
C70	0	23.672	0	1
C71	0	21.106	0	1
C7147	0	93.029	0	1
C72	0	22.939	0	1
C73	0	16.198	0	1

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Table 6F: Conduits (continued...)

Name	Max. Unit Flow (cfs/ac)	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
C74	0	22.898	0	1
C75	0	18.316	0	1
C76	0	21.39	0	1
C77	0	22.684	0	1
C78	0	16.12	0	1
C79	0	15.492	0	1
C8	0	6.125	0	1
C80	0	25.75	0	1
C81_1	0	63.577	0	1
C81_2	0	58.913	0	1
C82	0	34.523	0	1
C83	0	6.549	0	1
C9	0	20.69	0	1
C90	0	21.427	0	1
C92	0	11.948	0	1
C97	0	8.706	0	1

Table 7A: Weirs

Name	Inlet Node	Outlet Node	Tag	Type	Height (ft)	Length (ft)	Side Slope (ft/ft)	Inlet Offset (ft)	Discharge Coeff. (CFS)	Flap Gate	End Contractions	End Coeff. (CFS)
BasinOverflowWeir	_Rt6Basin&Forebay	_Rt6Basin_OF	Zone3	TRANSVERSE	2	120	0	4	3.33	NO	0	0
C19_1	DMH-32	DMH-32_Weir		TRANSVERSE	1	1	0	0.5	3.33	NO	0	0
W1	_Rt6Basin&Forebay	_Rt6Basin_OF		TRANSVERSE	2	17	0	3	3.33	NO	0	0

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Table 7B: Weirs

Name	Can Surcharge	Coeff. Curve	Road Width (ft)	Road Surface	Control Rules	Max. |Flow| (cfs)	Time Max. Flow (M/D/Y)	Max/Full Depth	Contributing Area (ac)	Contributing Imp. Area (ac)	Max. Unit Flow (cfs/ac)
BasinOverflowWeir	YES		0	PAVED	NO	0	10/31/2018 00:00 AM	0	0	0	0
C19_1	YES		0	PAVED	NO	3.29	10/31/2018 12:08 PM	1	0	0	0
W1	YES		0	PAVED	NO	26.62	10/31/2018 12:06 PM	0.3	0	0	0

Table 7C: Weirs

Name	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
BasinOverflowWeir	22.162	0	1
C19_1	3.586	0	1
W1	23.005	0	1

Table 8A: ARM Subcatchments

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S1	1010487.317	2847818.725	Zone 2		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB2	0.913	300	3.519
S10	1005708.415	2844682.934	Zone 1		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J20	0.352	300	8.406
S103_1	1007362.004	2845719.622	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J25	0.781	300	11.045
S103_2	1007058.318	2845579.838	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J1	0.636	300	14.154
S106	1011862.971	2845745.351	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH13	0.436	300	5.668
S11	1011368.787	2845042.386	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB30	0.24	300	11.124
S112	1011765.715	2845607.459	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH12	0.576	300	11.629
S117	1006645.061	2845292.582	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J8	1.28	300	7.392
S119	1011710.229	2845450.521	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB32	0.487	300	13.311

HEC

Table 8A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S12	1009155.269	2846806.185	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J28	1.163	300	11.343
S121	1006652.612	2845362.099	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J4	0.365	300	7.731
S122	1011582.402	2845423.142	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH11	0.033	300	5.762
S123_1	1011641.466	2845102.141	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB33	5.513	300	8.307
S126	1006771.027	2845326.81	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J7	0.373	300	8.112
S128_1	1011314.008	2844967.879	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB29	0.912	300	6.141
S128_3	1011439.667	2845206.557	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB27	0.082	300	5.357
S128_4	1011509.295	2845310.923	Zone 6	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	cb28	0.069	300	3.231
S13	1010995.082	2845155.655	Zone 5		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J428	9.522	300	9.391
S130	1006150.145	2845207.413	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J5	1.595	300	27.808
S135	1006040.366	2844957.721	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J13	0.89	300	15.026
S135_2	1005799.316	2844651.484	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J12	0.528	300	15.451
S135_4	1005715.768	2844640.674	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J12	0.218	300	10.886
S138	1006093.058	2844885.605	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J11	0.718	300	12.176
S14	1010073.132	2846967.657	Zone 1		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	OF-RS-13-S	8.285	300	10.506
S141	1011205.465	2844879.436	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH15	0.124	300	4.749
S2	1010278.468	2848203.067	Zone 2	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DuckPond	26.281	300	10.923
S2_1	1010537.761	2846249.488	Zone 4	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	_CourtStWetlandArea	0.379	300	16.627
S2_3	1010958.977	2846249.347	Zone 4	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB4	10.8	300	12.201
S23	1009578.801	2847171.57	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB36	0.524	300	10.193
S25	1010728.262	2847636.033	Zone 2	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH4	2.032	300	5.744
S26	1010339.143	2847226.97	Zone 3	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-10	0.546	300	3.813
S26_1	1010334.853	2847481.827	Zone 3	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-07	0.38	300	6.003
S30	1011355.912	2847415.335	Zone 2	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB104	4.405	300	11.115
S32	1010496.691	2847333.793	Zone 3	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-07	2.027	300	6.639
S33	1010881.808	2847329.337	Zone 2	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J611	8.854	300	10.761

Table 8A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S36	1011722.209	2847132.617	Zone 2	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB105	12.204	300	9.923
S46_2	1009603.012	2847123.201	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB37	0.538	300	4.621
S49_1	1010739.79	2846918.195	Zone 4	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-12	3.133	300	10.21
S49_6	1010444.732	2846453.095	Zone 4	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-14	0.451	300	8.23
S49_8	1010511.018	2846349.272	Zone 4	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-18	0.18	300	4.348
S52_2	1009925.542	2847338.791	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J30	0.249	300	3.955
S53	1011172.364	2846593.041	Zone 4	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J155	3.103	300	17.273
S6	1005494.968	2844432.915	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J22	0.279	300	8.507
S6_1	1008971.765	2846458.918	Zone 1		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J6	1.238	300	9.56
S6_3	1009439.368	2846742.738	Zone 1		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J27	4.78	300	12.857
S6_4	1009688.465	2847016.819	Zone 1		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	CB38	1.549	300	10.774
S7	1011037.519	2844670.263	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH17	0.125	300	9.111
S70_2	1010722.908	2845836.1	Zone 5	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-27	2.87	300	7.148
S75_2	1008565.796	2846294.473	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J6	1.627	300	11.794
S76_1	1011305.239	2845685.652	Zone 6	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J1364	5.302	300	12.888
S8	1005452.29	2844454.885	Zone 1		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J18	0.372	300	7.857
S80_1	1010894.296	2845731.405	Zone 5	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-28	0.578	300	4.766
S9	1011213.411	2844798.075	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH16	0.38	300	3.94
S90_1	1008157.655	2846015.314	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J17	0.138	300	5.266
S90_2	1008454.394	2846213.676	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J10	0.441	300	10.746
S97_2	1007093.128	2845499.64	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J3	0.299	300	6.44
S99_2	1007877.635	2845863.999	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J15	0.25	300	2.582
R1_1	1009851.312	2847349.892	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J31	0.487	300	6.426
R3_1	1010928.282	2845597.979	Zone 5	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-28	0.308	300	4.658
R3_3	1010998.99	2845602.639	Zone 5	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-30	0.039	300	4.658
R3_4	1011035.64	2845660.735	Zone 6	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	WinthropPond	0.788	300	4.66

Table 8A: ARM Subcatchments (continued...)

Name	X-Coordinate	Y-Coordinate	Description	Tag	Runoff Method	Rain Gage	Outlet	Area (ac)	Flow Length (ft)	Slope (%)
S98_3	1011974.591	2845873.89	Zone 6	Zone 6	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	MH14	0.201	300	13.371
R4_1	1007726.109	2845836.765	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J26	2.024	300	10.977
R4_2	1007900.864	2846047.495	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	OF-RS-9-N	0.479	300	10.988
R5	1009128.388	2847062.777	Zone 1		SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J29	1.586	300	10.734
S49	1010546.598	2846694.16	Zone 4	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-13	3.721	300	9.517
S26_3	1010180.612	2847427.572	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J30	1.572	300	6.225
S26_4	1010447.729	2847688.329	Zone 3	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-03	0.733	300	6.225
S28_1	1010049.406	2847533.073	Zone 1	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	J31	0.445	300	8.722
S28_2	1010238.884	2847650.034	Zone 3	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	Rt6Drywells	0.306	300	8.722
S5_1	-7813761.169	5168224.587	Zone 5	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	DMH-32	0.67	300	5.645
S5_2	-7813851.306	5168311.825	Zone 6	WDT	SCS Dimensionless UH	100yr24hr_NOAA_6.92in	WinthropPond	0.414	300	5.645

Table 8B: ARM Subcatchments

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.002	SCS CN
S10	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S103_1	0	0.05	11.618	3	0.5	4	7	0	1.93	4.739	0.413	User entered value	5	SCS CN
S103_2	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S106	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.041	SCS CN
S11	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S112	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S117	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.198	SCS CN
S119	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

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Table 8B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S12	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	6.7	SCS CN
S121	0	0.05	11.504	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S122	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S123_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S126	0	0.05	11.514	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.008	SCS CN
S128_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S128_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S128_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S13	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	9.7	SCS CN
S130	0	0.05	12.119	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.3	SCS CN
S135	0	0.05	11.577	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_2	0	0.05	11.529	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S135_4	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S138	0	0.05	11.53	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S14	0	0.05	12.22	3	0.5	4	7	0	1.982	4.347	0.41	User entered value	6.698	SCS CN
S141	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5.001	SCS CN
S2	0	0.05	12.46	3	0.5	4	7	0	2.868	2.723	0.397	User entered value	12.8	SCS CN
S2_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S2_3	0	0.05	11.581	3	0.5	4	7	0	2.396	1.208	0.39	User entered value	6.5	SCS CN
S23	0	0.05	11.5	3	0.5	4	7	0	1.932	4.728	0.413	User entered value	5	SCS CN
S25	0	0.05	11.576	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	13.9	SCS CN
S26	0	0.05	12.536	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S26_1	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S30	0	0.05	11.99	3	0.5	4	7	0	2.008	4.151	0.409	User entered value	7.3	SCS CN
S32	0	0.05	11.5	3	0.5	4	7	0	1.944	4.631	0.412	User entered value	5.9	SCS CN
S33	0	0.05	11.93	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	15.1	SCS CN

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Table 8B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S36	0	0.05	11.541	3	0.5	4	7	0	2.24	2.389	0.398	User entered value	24.9	SCS CN
S46_2	0	0.05	11.513	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S49_1	0	0.05	11.624	3	0.5	4	7	0	2.124	3.271	0.404	User entered value	17.9	SCS CN
S49_6	0	0.05	11.5	3	0.5	4	7	0	2.264	2.207	0.397	User entered value	5	SCS CN
S49_8	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S52_2	0	0.05	11.5	3	0.5	4	7	0	2.199	2.7	0.4	User entered value	5.001	SCS CN
S53	0	0.05	11.5	3	0.5	4	7	0	2.161	2.99	0.402	User entered value	5	SCS CN
S6	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S6_1	0	0.05	12.367	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.2	SCS CN
S6_3	0	0.05	12.239	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S6_4	0	0.05	11.509	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S7	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S70_2	0	0.05	11.504	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S75_2	0	0.05	12.11	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	8.2	SCS CN
S76_1	0	0.05	11.623	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	7.6	SCS CN
S8	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S80_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S9	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S90_1	0	0.05	12.035	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S90_2	0	0.05	11.63	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S97_2	0	0.05	11.726	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S99_2	0	0.05	11.942	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5.243	SCS CN
R1_1	0	0.05	11.5	3	0.5	4	7	0	2.111	3.37	0.404	User entered value	5	SCS CN
R3_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R3_4	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

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Table 8B: ARM Subcatchments (continued...)

Name	Imperv. (%)	Dstore Imperv (in)	Dstore Perv (in)	Max. Infil. Rate (in/hr)	Min. Infil. Rate (in/hr)	Decay Constant (1/hr)	Drying Time (days)	Max. Volume (in)	Suction Head (in)	Conductivity (in/hr)	Initial Deficit (frac.)	TC Method	Time of Concentration (min)	Loss Method
S98_3	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
R4_1	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	27.172	SCS CN
R4_2	0	0.05	11.748	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
R5	0	0.05	12.229	3	0.5	4	7	0	2.154	3.045	0.402	User entered value	5	SCS CN
S49	0	0.05	11.531	3	0.5	4	7	0	2.222	2.528	0.399	User entered value	5	SCS CN
S26_3	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	9.199	SCS CN
S26_4	0	0.05	11.5	3	0.5	4	7	0	1.93	4.74	0.413	User entered value	5	SCS CN
S28_1	0	0.05	11.846	3	0.5	4	7	0	2.268	4.014	0.407	User entered value	5	SCS CN
S28_2	0	0.05	11.846	3	0.5	4	7	0	2.268	4.014	0.407	User entered value	5	SCS CN
S5_1	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN
S5_2	0	0.05	11.5	3	0.5	4	7	0	2.4	1.18	0.39	User entered value	5	SCS CN

Table 8C: ARM Subcatchments

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S1	0.2 S	0.341	85.437	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S10	0.2 S	0.143	93.311	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_1	0.2 S	0.954	67.694	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S103_2	0.2 S	1.069	65.171	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S106	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S11	0.2 S	0.053	97.442	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S112	0.2 S	0.172	92.078	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S117	0.2 S	0.757	72.555	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S119	0.2 S	0.263	88.363	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 8C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S12	0.2 S	1.682	54.323	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S121	0.2 S	0.479	80.683	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S122	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S123_1	0.2 S	0.167	92.274	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S126	0.2 S	0.437	82.083	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_1	0.2 S	0.069	96.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_3	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S128_4	0.2 S	0.041	98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S13	0.2 S	0.79	71.684	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S130	0.2 S	2.219	47.407	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135	0.2 S	0.47	80.956	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_2	0.2 S	0.633	75.95	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S135_4	0.2 S	0.076	96.349	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S138	0.2 S	0.501	79.966	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S14	0.2 S	0.674	74.802	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S141	0.2 S	0.159	92.649	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2	0.2 S	1.716	53.822	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2_1	0.2 S	1.5	57.14	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S2_3	0.2 S	0.628	76.108	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S23	0.2 S	0.992	66.854	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S25	0.2 S	0.429	82.355	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26	0.2 S	0.116	94.511	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_1	0.2 S	0.31	86.57	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S30	0.2 S	1.372	59.304	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S32	0.2 S	0.483	80.561	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S33	0.2 S	0.979	67.134	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 8C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S36	0.2 S	1.122	64.068	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S46_2	0.2 S	2.628	43.214	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_1	0.2 S	0.276	87.865	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_6	0.2 S	0.163	92.468	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49_8	0.2 S	0.099	95.301	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S52_2	0.2 S	0.193	91.191	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S53	0.2 S	0.547	78.512	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6	0.2 S	0.309	86.616	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_1	0.2 S	2.361	45.862	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_3	0.2 S	1.676	54.401	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S6_4	0.2 S	1.215	62.204	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S7	0.2 S	0.043	97.919	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S70_2	0.2 S	0.375	84.193	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S75_2	0.2 S	0.915	68.606	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S76_1	0.2 S	0.778	71.999	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S8	0.2 S	0.327	85.953	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S80_1	0.2 S	0.133	93.776	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S9	0.2 S	0.048	97.656	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_1	0.2 S	0.221	90.05	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S90_2	0.2 S	0.712	73.746	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S97_2	0.2 S	0.51	79.69	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S99_2	0.2 S	0.148	93.108	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R1_1	0.2 S	0.679	74.65	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_1	0.2 S	0.216	90.243	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_3	0.2 S	0.106	94.961	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R3_4	0.2 S	0.563	78.027	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

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Table 8C: ARM Subcatchments (continued...)

Name	IA Method	IA Value (in)	SCS Curve Number	Peak Rate Factor	Initial Loss (in)	Const. Rate (in/hr)	Runoff Coef.	Lag Time (min)	Peak Coef.	# Reservoirs	Storage Coef. (h)	IDF Curve	Return Period (y)	Steady Duration (mins)	Peak Rainfall (in/hr)
S98_3	0.2 S	0.214	90.344	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R4_1	0.2 S	0.703	73.983	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R4_2	0.2 S	3.561	35.964	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
R5	0.2 S	0.652	75.409	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S49	0.2 S	0.294	87.195	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_3	0.2 S	0.46	81.302	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S26_4	0.2 S	0.382	83.98	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S28_1	0.2 S	0.761	72.45	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S28_2	0.2 S	0.359	84.783	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S5_1	0.2 S	0.07	96.61	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0
S5_2	0.2 S	1.061	65.34	Standard (483.4)	0	0	0.6	30	0.6	3	0.4		5	60	0

Table 8D: ARM Subcatchments

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S1	0.1	2017			No	0	0	0	0	6.914	1.694	5.268	0.131	4.584
S10	0.1	2017			No	0	0	0	0	6.914	0.792	6.18	0.059	1.952
S103_1	0.1	2017			No	0	0	0	0	6.914	3.605	3.341	0.071	2.576
S103_2	0.1	2017			No	0	0	0	0	6.914	3.861	3.082	0.053	1.927
S106	0.1	2017			No	0	0	0	0	6.914	0.239	6.741	0.08	2.486
S11	0.1	2017			No	0	0	0	0	6.914	0.305	6.671	0.043	1.367
S112	0.1	2017			No	0	0	0	0	6.914	0.935	6.036	0.094	3.157
S117	0.1	2017			No	0	0	0	0	6.914	3.1	3.814	0.133	4.238
S119	0.1	2017			No	0	0	0	0	6.914	1.363	5.604	0.074	2.554

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Table 8D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S12	0.1	2017			No	0	0	0	0	6.914	4.907	2.05	0.065	2.05
S121	0.1	2017			No	0	0	0	0	6.914	2.224	4.734	0.047	1.682
S122	0.1	2017			No	0	0	0	0	6.914	0.239	6.738	0.006	0.188
S123_1	0.1	2017			No	0	0	0	0	6.914	0.912	6.056	0.907	30.277
S126	0.1	2017			No	0	0	0	0	6.914	2.069	4.891	0.05	1.766
S128_1	0.1	2017			No	0	0	0	0	6.914	0.399	6.576	0.163	5.175
S128_3	0.1	2017			No	0	0	0	0	6.914	0.239	6.739	0.015	0.468
S128_4	0.1	2017			No	0	0	0	0	6.914	0.239	6.739	0.013	0.394
S13	0.1	2017			No	0	0	0	0	6.914	3.191	3.706	0.958	30.393
S130	0.1	2017			No	0	0	0	0	6.914	5.518	1.406	0.061	1.786
S135	0.1	2017			No	0	0	0	0	6.914	2.194	4.763	0.115	4.123
S135_2	0.1	2017			No	0	0	0	0	6.914	2.739	4.215	0.06	2.192
S135_4	0.1	2017			No	0	0	0	0	6.914	0.435	6.541	0.039	1.235
S138	0.1	2017			No	0	0	0	0	6.914	2.303	4.654	0.091	3.26
S14	0.1	2017			No	0	0	0	0	6.914	2.861	4.14	0.931	32.387
S141	0.1	2017			No	0	0	0	0	6.914	0.869	6.103	0.021	0.683
S2	0.1	2017			No	0	0	0	0	6.914	4.953	1.95	1.391	39.376
S2_1	0.1	2017			No	0	0	0	0	6.914	4.645	2.291	0.024	0.822
S2_3	0.1	2017			No	0	0	0	0	6.914	2.722	4.27	1.252	43.741
S23	0.1	2017			No	0	0	0	0	6.914	3.69	3.254	0.046	1.681
S25	0.1	2017			No	0	0	0	0	6.914	2.039	4.856	0.268	8.048
S26	0.1	2017			No	0	0	0	0	6.914	0.651	6.322	0.094	3.058
S26_1	0.1	2017			No	0	0	0	0	6.914	1.567	5.398	0.056	1.942
S30	0.1	2017			No	0	0	0	0	6.914	4.438	2.536	0.303	9.87
S32	0.1	2017			No	0	0	0	0	6.914	2.237	4.712	0.259	9.119
S33	0.1	2017			No	0	0	0	0	6.914	3.662	3.226	0.776	22.753

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Table 8D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S36	0.1	2017			No	0	0	0	0	6.914	3.971	2.943	0.975	24.469
S46_2	0.1	2017			No	0	0	0	0	6.914	5.86	1.064	0.016	0.38
S49_1	0.1	2017			No	0	0	0	0	6.914	1.419	5.501	0.468	12.556
S49_6	0.1	2017			No	0	0	0	0	6.914	0.89	6.081	0.074	2.482
S49_8	0.1	2017			No	0	0	0	0	6.914	0.558	6.415	0.031	1.014
S52_2	0.1	2017			No	0	0	0	0	6.914	1.038	5.932	0.04	1.352
S53	0.1	2017			No	0	0	0	0	6.914	2.461	4.495	0.379	13.66
S6	0.1	2017			No	0	0	0	0	6.914	1.561	5.403	0.041	1.427
S6_1	0.1	2017			No	0	0	0	0	6.914	5.647	1.278	0.043	1.198
S6_3	0.1	2017			No	0	0	0	0	6.914	4.9	2.033	0.264	8.973
S6_4	0.1	2017			No	0	0	0	0	6.914	4.156	2.785	0.117	4.201
S7	0.1	2017			No	0	0	0	0	6.914	0.249	6.728	0.023	0.713
S70_2	0.1	2017			No	0	0	0	0	6.914	1.834	5.127	0.4	14.114
S75_2	0.1	2017			No	0	0	0	0	6.914	3.511	3.451	0.152	5.021
S76_1	0.1	2017			No	0	0	0	0	6.914	3.158	3.85	0.554	18.75
S8	0.1	2017			No	0	0	0	0	6.914	1.636	5.327	0.054	1.883
S80_1	0.1	2017			No	0	0	0	0	6.914	0.737	6.234	0.098	3.218
S9	0.1	2017			No	0	0	0	0	6.914	0.28	6.697	0.069	2.165
S90_1	0.1	2017			No	0	0	0	0	6.914	1.169	5.799	0.022	0.74
S90_2	0.1	2017			No	0	0	0	0	6.914	2.974	3.977	0.048	1.733
S97_2	0.1	2017			No	0	0	0	0	6.914	2.333	4.624	0.038	1.35
S99_2	0.1	2017			No	0	0	0	0	6.914	0.815	6.146	0.042	1.376
R1_1	0.1	2017			No	0	0	0	0	6.914	2.878	4.074	0.054	1.958
R3_1	0.1	2017			No	0	0	0	0	6.914	1.147	5.822	0.049	1.654
R3_3	0.1	2017			No	0	0	0	0	6.914	0.598	6.375	0.007	0.219
R3_4	0.1	2017			No	0	0	0	0	6.914	2.514	4.44	0.095	3.432

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Table 8D: ARM Subcatchments (continued...)

Name	Roughness	Version	Rainfall Zone	Soil Type	Hydrograph Fattening	Runoff Depth (in)	Total rainfall (in)	Fire Factor	User entered PRF	Precipitation (in)	Infiltration (in)	Runoff Depth (in)	Runoff Volume (MG)	Peak Runoff (cfs)
S98_3	0.1	2017			No	0	0	0	0	6.914	1.136	5.833	0.032	1.081
R4_1	0.1	2017			No	0	0	0	0	6.914	2.949	3.966	0.218	5.391
R4_2	0.1	2017			No	0	0	0	0	6.914	6.383	0.536	0.007	0.103
R5	0.1	2017			No	0	0	0	0	6.914	2.797	4.156	0.179	6.498
S49	0.1	2017			No	0	0	0	0	6.914	1.496	5.469	0.553	19.195
S26_3	0.1	2017			No	0	0	0	0	6.914	2.156	4.756	0.203	6.478
S26_4	0.1	2017			No	0	0	0	0	6.914	1.858	5.104	0.102	3.592
S28_1	0.1	2017			No	0	0	0	0	6.914	3.111	3.839	0.046	1.689
S28_2	0.1	2017			No	0	0	0	0	6.914	1.768	5.194	0.043	1.52
S5_1	0.1	2017			No	0	0	0	0	6.914	0.404	6.57	0.12	3.801
S5_2	0.1	2017			No	0	0	0	0	6.914	3.844	3.099	0.035	1.262

Table 8E: ARM Subcatchments

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S1	0.762	315.069	3688.787	1
S10	0.894	269.666	1423.459	1
S103_1	0.483	377.028	3159.303	1
S103_2	0.446	295.706	2574.745	1
S106	0.975	233.481	1631.88	1
S11	0.965	168.535	969.45	1
S112	0.873	307.634	2332.704	1
S117	0.552	712.861	5180.467	1
S119	0.811	179.431	1969.813	1

Table 8E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S12	0.297	494.459	4707.633	1
S121	0.685	270.8	1476.259	1
S122	0.975	59.644	132.225	1
S123_1	0.876	668.642	22309.393	1
S126	0.707	304.22	1500.539	1
S128_1	0.951	362.657	3683.22	1
S128_3	0.975	88.73	333.025	1
S128_4	0.975	131.285	280.734	1
S13	0.536	895.981	38534.838	1
S130	0.203	622.887	6453.473	1
S135	0.689	370.13	3603.291	1
S135_2	0.61	315.527	2135.183	1
S135_4	0.946	194.92	883.385	1
S138	0.673	345.481	2904.866	1
S14	0.599	796.88	33566.433	1
S141	0.883	100.226	495.075	1
S2	0.282	1627.441	106358.672	1
S2_1	0.331	157.843	1534.804	1
S2_3	0.618	1284.924	43708.974	1
S23	0.471	289.85	2122.072	1
S25	0.702	572.013	8217.123	1
S26	0.914	226.137	2209.877	1
S26_1	0.781	210.057	1536.428	1
S30	0.367	617.351	17821.744	1
S32	0.681	756.561	8203.518	1
S33	0.467	1019.231	35810.985	1

Draft

Table 8E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S36	0.426	1284.844	49364.997	1
S46_2	0.154	317.357	1711.653	1
S49_1	0.796	824.311	12680.818	1
S49_6	0.88	195.824	1823.61	1
S49_8	0.928	121.828	726.955	1
S52_2	0.858	208.657	1007.1	1
S53	0.65	693.413	12557.385	1
S6	0.781	201.685	1127.756	1
S6_1	0.185	349.322	5010.388	1
S6_3	0.294	667.94	19372.264	1
S6_4	0.403	354.418	6315.075	1
S7	0.973	129.15	502.961	1
S70_2	0.742	717.708	11615.95	1
S75_2	0.499	1002.106	6583.03	1
S76_1	0.557	859.132	21455.902	1
S8	0.771	242.966	1506.778	1
S80_1	0.902	242.097	2340.437	1
S9	0.969	211.337	1535.98	1
S90_1	0.839	153.485	557.903	1
S90_2	0.575	338.375	1784.976	1
S97_2	0.669	294.868	1210.755	1
S99_2	0.889	267.109	928.72	1
R1_1	0.589	234.206	1969.851	1
R3_1	0.842	147.113	1245.434	1
R3_3	0.922	49.68	159.372	1
R3_4	0.642	353.112	3185.744	1

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Table 8E: ARM Subcatchments (continued...)

Name	Runoff Coefficient	GIS_LENGTH (m)	GIS_AREA (m²)	GIS_PARTS
S98_3	0.844	178.953	814.244	1
R4_1	0.574	785.818	8199.973	1
R4_2	0.078	257.642	1939.276	1
R5	0.601	347.858	6416.274	1
S49	0.791	673.495	15059.147	2
S26_3	0.688	327.093	6360.744	1
S26_4	0.738	358.119	2966.598	1
S28_1	0.555	229.348	1802.078	1
S28_2	0.751	166.11	1238.128	1
S5_1	0.95	324.692	2712.267	1
S5_2	0.448	258.975	1674.737	1

DRAFT

DOCUMENT A00861

PROVINCETOWN CONSERVATION COMMISSION

ORDER OF CONDITIONS

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PROVINCETOWN CONSERVATION COMMISSION

OFFICE OF COMMUNITY DEVELOPMENT
TOWN OF PROVINCETOWN
260 COMMERCIAL STREET
PROVINCETOWN, MASSACHUSETTS 02657
(508) 487-7020

By Hand Delivery

October 17, 2025

Braden Witt
Provincetown DPW
2 Mayflower Ave
Provincetown MA 02657

RE: Order of Conditions, DEP File no. SE 058-0763, Case no. CON-25-4
ROUTE 6, SHANK PAINTER RD, AND COURT ST, Provincetown, MA

Dear applicant:

Enclosed is the original Order of Conditions referenced above, which was approved by the Provincetown Conservation Commission at its public hearing on October 7, 2025. The Order must be recorded at the Barnstable County Registry of Deeds or filed with the Barnstable Registration District of the Land Court, as applicable, and the recording/filing information must be provided to the Conservation Commission prior to commencement of work.

Please let me know when this project will commence so that we can schedule a pre-construction site visit. If you have any questions, please feel free to contact me by phone at (508) 487-7000 x571 or by email at mnickerson@provincetown-ma.gov.

Regards,

Melyssa Nickerson
Conservation Agent & Environmental Planner

Enclosures

cc: DEP Southeast Region (by eDEP)
Property File

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 - Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File #:058-0763
eDEP Transaction #:1948131
City/Town:PROVINCETOWN

A. General Information

1. Conservation Commission: PROVINCETOWN
2. Issuance: a. ☑ OOC b. ☐ Amended OOC
3. Applicant Details

a. First Name	JIM	b. Last Name	VINCENT
c. Organization	TOWN OF PROVINCETOWN		
d. Mailing Address	260 COMMERCIAL STREET		
e. City/Town	PROVINCETOWN	f. State MA	g. Zip Code 02657

4. Property Owner

a. First Name	TOWN OF	b. Last Name	PROVINCETOWN
c. Organization	TOWN OF PROVINCETOWN		
d. Mailing Address	260 COMMERCIAL ST		
e. City/Town	PROVINCETOWN	f. State MA	g. Zip Code 02657

5. Project Location

a.Street Address	SHANK PAINTER ROAD, ROUTE 6 AND COURT STREET ROW *		
b.City/Town	PROVINCETOWN	c. Zip Code	02657
d. Assessors Map/Plat#	8-1	e. Parcel/Lot#	15-0
f. Latitude	42.05141N	g. Longitude	70.19544W

6. Property recorded at the Registry of Deed for:

a. County	b. Certificate	c. Book	d. Page
BARNSTABLE		1450	818

7.Dates

a. Date NOI Filed : 1/21/2025 b. Date Public Hearing Closed: 10/7/2025 c. Date Of Issuance: 10/16/2025

8.Final Approved Plans and Other Documents

a. Plan Title:	b. Plan Prepared by:	c. Plan Signed/Stamped by:	d. Revised Final Date:	e. Scale:
SEE ATTACHMENT A				

B. Findings

1.Findings pursuant to the Massachusetts Wetlands Protection Act
Following the review of the the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act.

Check all that apply:

a. ☐ Public Water Supply	b. ☐ Land Containing Shellfish	c. ☐ Prevention of Pollution
d. ☐ Private Water Supply	e. ☐ Fisheries	f. ☐ Protection of Wildlife Habitat
g. ☐ Ground Water Supply	h. ☑ Storm Damage Prevention	i. ☑ Flood Control

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2. Commission hereby finds the project, as proposed, is:

Approved subject to:

a. ☑ The following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Denied because:

b. ☐ The proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ The information submitted by the applicant is not sufficient to describe the site, the work or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the interests of the Act , and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts:Shortest distance between limit of project disturbance and the wetland resource area specified in 310CMR10.02(1)(a). _____ a. linear feet

Inland Resource Area Impacts:(For Approvals Only):

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☐ Bank	_____ a. linear feet	_____ b. linear feet	_____ c. linear feet	_____ d. linear feet
5. ☐ Bordering Vegetated Wetland	_____ a. square feet	_____ b. square feet	_____ c. square feet	_____ d. square feet
6. ☐ Land under Waterbodies and Waterways	_____ a. square feet	_____ b. square feet	_____ c. square feet	_____ d. square feet
	_____ e. c/y dredged	_____ f. c/y dredged		
7. ☐ Bordering Land Subject to Flooding	_____ a. square feet	_____ b. square feet	_____ c. square feet	_____ d. square feet
Cubic Feet Flood Storage	_____ e. cubic feet	_____ f. cubic feet	_____ g. cubic feet	_____ h. cubic feet
8. ☐ Isolated Land Subject to Flooding	_____ a. square feet	_____ b. square feet		
Cubic Feet Flood Storage	_____ c. cubic feet	_____ d. cubic feet	_____ e. cubic feet	_____ f. cubic feet

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9.☐ Riverfront Area

a. total sq. feet _____ b. total sq. feet _____

Sq ft within 100 ft

c. square feet _____ d. square feet _____ e. square feet _____ f. square feet _____

Sq ft between 100-200 ft

g. square feet _____ h. square feet _____ i. square feet _____ j. square feet _____

Coastal Resource Area Impacts:

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement

10.☐ Designated Port Areas — Indicate size under Land Under the Ocean, below

11.☐ Land Under the Ocean

a. square feet _____ b. square feet _____

c. c/y dredged _____ d. c/y dredged _____

12.☐ Barrier Beaches — Indicate size under Coastal Beaches and/or Coastal Dunes below

13.☐ Coastal Beaches

a. square feet _____ b. square feet _____ c. c/y nourishment _____ d. c/y nourishment _____

14.☐ Coastal Dunes

a. square feet _____ b. square feet _____ c. c/y nourishment _____ d. c/y nourishment _____

15.☐ Coastal Banks

a. linear feet _____ b. linear feet _____

16.☐ Rocky Intertidal Shores

a. square feet _____ b. square feet _____

17.☐ Salt Marshes

a. square feet _____ b. square feet _____ c. square feet _____ d. square feet _____

18.☐ Land Under Salt Ponds

a. square feet _____ b. square feet _____

c. c/y dredged _____ d. c/y dredged _____

19.☐ Land Containing Shellfish

a. square feet _____ b. square feet _____ c. square feet _____ d. square feet _____

20.☐ Fish Runs — Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above

c. c/y dredged _____ d. c/y dredged _____

21.☑ Land Subject to Coastal Storm Flowage

a. square feet 79482 b. square feet _____

22.

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☐ Restoration/Enhancement (For Approvals Only)

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c & d or B.17.c & d above, please entered the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

23.

☐ Streams Crossing(s)

If the project involves Stream Crossings, please enter the number of new stream crossings/number of replacement stream crossings.

a. number of new stream crossings

b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. the work is a maintenance dredging project as provided for in the Act; or
   b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not exceed the issuance date of the original Final Order of Conditions.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.
8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.
9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work..
10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

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11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before Mass DEP.
12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.
13. The work shall conform to the plans and special conditions referenced in this order.
14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.
15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.
16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.
17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

NOTICE OF STORMWATER CONTROL AND MAINTENANCE REQUIREMENTS

19. The work associated with this Order(the "Project") is (1) ☑ is not (2)☐ subject to the Massachusetts Stormwater Standards. If the work is subject to Stormwater Standards, then the project is subject to the following conditions;

a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollutant Discharge Elimination System Construction General Permit as required by Stormwater Standard 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that: *i.* all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures; *ii.*. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is

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fully stabilized; *iii.* any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10; *iv.* all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition; *v.* any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 19(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement") for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following: i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollutant Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 19(f) through 19(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 19(f) through 19(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as

defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions:

SEE ATTACHMENT A

Massachusetts Department of Environmental Protection
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D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☑ Yes ☐ No

2. The Conservation Commission hereby(check one that applies):

a. ☐ DENIES the proposed work which cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw specifically:

1. Municipal Ordinance or Bylaw _____ 2. Citation _____

Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order or Conditions is issued. Which are necessary to comply with a municipal ordinance or bylaw:

b. ☑ APPROVES the proposed work, subject to the following additional conditions.

1. Municipal Ordinance or Bylaw PROVINCETOWN WETLANDS PROTECTION BYLAW AND REGULATIONS 2. Citation _____

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

The special conditions relating to municipal ordinance or bylaw are as follows:
SEE ATTACHMENT A

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
058-0763
MassDEP File #

eDEP Transaction #

Provincetown
City/Town

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

10/17/25
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

3
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Provincetown Conservation Commission

Signature	Printed Name
	Nathaniel Mayo, Chair
	Mark Adams, Vice Chair
	Oriana Conklin
	Sylvia Tomayko-Peters
	Marianne Clements

☐ by hand delivery on

Date

☐ by certified mail, return receipt requested, on

Date

PROVINCETOWN CONSERVATION COMMISSION

OFFICE OF COMMUNITY DEVELOPMENT
TOWN OF PROVINCETOWN
260 COMMERCIAL STREET
PROVINCETOWN, MASSACHUSETTS 02657
(508)487-7000

ATTACHMENT A: SPECIAL CONDITIONS, ORDER OF CONDITIONS FOR AREAS ALONG ROUTE 6, SHANK PAINTER RD, AND COURT ST, DEP FILE # SE 058-0763, CASE # CON-25-4

PROJECT DESCRIPTION:

Notice of Intent filed by the Town of Provincetown, pursuant to the Massachusetts Wetlands Protection Act (M.G.L. c. 131, s. 40) and the Provincetown General Bylaws Chapter 12, Wetlands Protection Bylaw, to improve pedestrian and bicycle connections and drainage with a combination of shared-use paths, sidewalks, narrowed vehicular travel lanes, a roundabout, and a new stormwater management system. Work to take place within Bordering Vegetated Wetland, Isolated Vegetated Wetland, Land Subject to Coastal Storm Flowage and NHESP Habitat.

FINAL APPROVED PLANS AND DOCUMENTS:

- Notice of Intent (NOI) for a Limited Project, Shank Painter Road and Route 6 Roadway Reconstruction Project, Town of Provincetown, MA, submitted by APEX Companies LLC, January 17, 2025 and later revised as listed below:
  - NOI Project Narrative (Updated July 30, 2025)
  - Appendix A: WPA Form 3 and Wetlands Transmittal Form (Updated July 30, 2025)
  - Appendix B: Wetland Evaluation/Delineation Reports (Updated May 7, 2025)
  - Appendix C: Project GIS Mapping
  - Appendix D: Permitting Design Plans (Updated July 30, 2025)
  - Appendix E: Certified Abutters List and Notification Form (Updated July 30, 2025)
  - Appendix F: Stormwater Report (Updated as noted)
  - Appendix G: Site Photos
  - Appendix H: Assessors Maps
  - Appendix I: NHESP Proof of Mailing and Conditional Approval (Updated June 27, 2025)
  - Appendix J: Compensatory Storage and Wetland Impact Area (Updated May 5, 2025)

SPECIAL CONDITIONS:

PRECONSTRUCTION

1. Notice shall be given to the Commission in writing 48 hours prior to commencement of work. The applicant shall advise the Commission of the name(s), emails and telephone numbers of the person(s) responsible on site for compliance with these conditions.

2. Prior to the commencement of any work, a pre-construction meeting on site shall be scheduled by the applicant's representative, and shall include the project contractor, engineer and conservation agent. During the meeting, conditions, construction protocol, work limit and site plan details shall be reviewed.
3. A planting plan for disturbed areas, including the area around the infiltration basin north of Shank Painter Rd, the median of the shared use path and existing median south of Route 6, and wetland disturbance, shall be submitted to the conservation agent for review and approval prior to the commencement of any work. The National Park Service, Open Space Committee, Public Landscape Committee, and other relevant stakeholders shall be consulted on the plan as well, particularly in areas where management overlaps between stakeholders. The planting plan will include a variety of native species to best support wildlife habitat, erosion control, and other wetland interests as appropriate, including native trees, shrubs, groundcovers, grasses and perennials, based on the respective wetland resource areas. The plan will also include seed mix specifications (preferably native) for areas where other plantings are not possible due to maintenance/access requirements.
4. Per the NHESP Conditional Approval, prior to the start of work (including vegetation clearing or soil disturbance), the Applicant shall submit an Eastern Box Turtle Protection Plan to the Division for review and written approval. Said Plan shall detail procedures for protecting state-listed turtles during construction, and be prepared and implemented by a qualified, Division-approved wildlife biologist. The Division is available for consultation on Plan development and can provide contact information for qualified biologists. The Division-approved Plan shall be implemented as written; any proposed changes to the Plan must be submitted to the Division for review and written approval prior to implementation of said changes. By December 31st of any year in which work occurs, the qualified biologist shall submit: a) a summary report to the Division detailing project status and compliance with the Plan; and b) any observations of state-listed turtles. This plan shall automatically become part of the Conservation record, and a copy will be stored at the Provincetown Department of Public Works until a Certificate of Compliance has been issued by the Conservation Commission.
5. Erosion control measures shall be properly installed as appropriate and verified by the conservation agent prior to the start of work.
6. No work shall be undertaken until the permit issued by the Commission is recorded at the Barnstable County Registry of Deeds, or filed with the Barnstable Registration District of the Land Court, as applicable, and the recording/filing information is provided to the Commission.

CONSTRUCTION

7. Details of the site plans, the project narrative and construction protocol, including the Stormwater Report in the above-referenced Final Approved Plans and Documents shall be incorporated in these conditions. A dewatering plan for the Court St improvements shall automatically become part of this record, and shall be submitted prior to discharge of groundwater.
8. All access to the work area shall be done within existing walkways, driveways and parking areas to minimize impacts to wildlife and/or wetlands.
9. Erosion controls shall be maintained throughout the duration of the project. Maintenance shall

include re-staking and removing accumulated soil as needed and as required; if erosion control measures as designed are not adequate, they shall be replaced or augmented with additional silt fencing, straw-bales, jute mesh or coir logs as needed. Erosion controls shall remain in place until conservation agent approval for removal is received in writing.

10. All drainage structures/catch basins within or in close proximity to the work site shall be protected from sedimentation and runoff by lining them with geotextile filter fabric, which shall be monitored on a daily basis and cleaned of accumulated sediment, and/or replaced, as needed.
11. All materials and debris shall be properly stored within the work area and shall not be stored within wetlands. Material stockpiles that are in place for longer than one workday shall be stabilized with straw wattles, erosion control blankets or tarps, and any other measures necessary to prevent migration of sediment from the project site. Debris shall either be removed from the worksite daily or stored within covered dumpsters placed on existing pavement or other disturbed area. All equipment and materials shall be removed upon project completion.
12. If soils are to be disturbed for longer than two months, a temporary cover of rye or other grass should be established to prevent erosion and sedimentation. If the season is not appropriate for plant growth, exposed surfaces shall be stabilized by other appropriate erosion control measures and firmly anchored to prevent soils from being washed by rain or flooding. Upon completion of work, all disturbed and bare areas shall be re-vegetated to prevent erosion by wind or water.
13. An emergency spill kit shall be kept on site to remediate any leaks or spills from equipment or vehicles used during construction. Fueling or repairs of equipment may not occur on-site.
14. The conservation agent shall be informed of any proposed changes to approved plans, which shall require either written conservation agent approval or, if significant, filing of a new application.
15. The site shall be cleaned up immediately following the completion of construction.
16. The conservation agent shall be notified upon completion of work.

POST-CONSTRUCTION

17. All disturbed natural areas shall be replanted per the approved planting plan, ensuring that all plantings survive or are replaced within the first three years. Vegetation Management, and assessment of future native planting opportunities, shall be incorporated into the Operation and Management Plan. The Operation and Management Plan shall become part of this record.
18. All disturbed roadway shall be restored or improved after work is complete. Wherever possible, drainage, grading, and permeability shall be improved.
19. No herbicides shall be used on site. This condition is a perpetual maintenance condition and shall not expire upon the issuance of a Certificate of Compliance.
20. No synthetic fertilizers shall be used on site. This condition is a perpetual maintenance condition and shall not expire upon the issuance of a Certificate of Compliance.
21. Erosion controls shall be removed only upon written receipt of conservation agent approval.
22. Upon completion of construction, the applicant shall submit written notification thereof to the conservation agent, who shall promptly schedule a site visit to confirm that the work has been substantially completed in accordance with the approved plans, and the applicant shall thereafter submit a Request for a Certificate of Compliance to the Conservation Commission.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 - Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File #:058-0763
eDEP Transaction #:1948131
City/Town:PROVINCETOWN

subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

PROVINCETOWN
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

PROVINCETOWN
Conservation Commission

Please be advised that the Order of Conditions for the Project at:

SHANK PAINTER ROAD, ROUTE 6 AND COURT STREET ROW *
Project Location

058-0763
MassDEP File Number

Has been recorded at the Registry of Deeds of:

County Book Page

for:

Property Owner TOWN OF PROVINCETOWN

and has been noted in the chain of title of the affected property in:

Book Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

Rev. 4/1/2010

DOCUMENT A00870

MASSACHUSETTS
DIVISION OF FISHERIES AND WILDLIFE

NATURAL HERITAGE AND ENDANGERED SPECIES PROGRAM SPECIES LIST

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MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

June 27, 2025

Braden Witt
Town of Provincetown
260 Commercial Street
Provincetown, Massachusetts 02657

RE: Applicant: Braden Witt, Town of Provincetown
Project Location: Route 6 between Province Lands Road and Shank Painter Road
Project Description: Road Reconstruction
NHESP File No.: 25-19242

Dear Applicant:

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife (the "Division") received the MESA Project Review Checklist and supporting documentation for review pursuant to the Massachusetts Endangered Species Act (MGL. c. 131A) and its implementing regulations (321 CMR 10.00) (MESA).

STATE-LISTED SPECIES
The Project as currently proposed will occur within Priority Habitat of the following state-listed species:

Scientific Name	Common Name	Taxonomic Group	State Status
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern
Papaipema sulphurata	Water-willow Stem Borer	Butterfly/Moth	Threatened
Carex oligosperma	Few-seeded Sedge	Plant	Endangered

State-listed species and their habitats are protected in accordance with the MESA.

PROJECT DESCRIPTION (the "Project")
The project, as currently proposed, includes the reconstruction of the 4-lane Route 6 corridor into a 2-lane highway and shared use path as shown on the Project Plan.

MASSACHUSETTS ENDANGERED SPECIES ACT (MESA)
The MESA is administered by the Division and prohibits the Take of state-listed species, which includes actions that

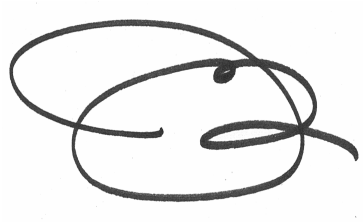
"in reference to animals, means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of habitat of state-listed wildlife species" (321 CMR 10.02). The purpose of the Division's review under the MESA regulations is to determine whether a Take of state-listed species will result from the proposed project.

Based on the information provided and the information contained in our database, the Division finds that the Project **must be conditioned** to avoid a prohibited Take of state-listed species (321 CMR 10.18(2)(a)). **To avoid a prohibited Take of state-listed species, the conditions attached to this letter must be met.**

Provided the attached conditions are fully implemented and there are no changes to the project plans, this project will not result in a Take of state-listed species. We note that all work is subject to the anti-segmentation provisions (321 CMR 10.16) of the MESA. This determination is a final decision of the Division of Fisheries and Wildlife pursuant to 321 CMR 10.18. Any changes to the proposed project or any additional work beyond that shown on the site plans may require an additional filing with the Division pursuant to the MESA. This project may be subject to further review if no physical work is commenced within five years from the date of issuance of this determination, or if there is a change to the project.

If you have any questions regarding this letter please contact Tim McGuire Endangered Species Review Biologist, at timothy.mcguire2@mass.gov, (508)389-6366.

Sincerely,



Jesse Leddick
Assistant Director

cc: Maria George, Apex Companies, LLC

Attachment: List of Conditions

List of Conditions

Applicant: Braden Witt, Town of Provincetown
Project Location: Route 6 between Province Lands Road and Shank Painter Road
Project Description: Road Reconstruction
NHESP File No.: 25-19242
Heritage Hub Form ID: RC-91651
Approved Plan: Massachusetts Department of Transportation Highway Division Plan and Profile of Shank Painter Road and Route 6
Plan date: 10/3/24

To avoid a prohibited Take of state-listed species, the following condition(s) must be met:

1. **Turtle Protection Plan:** Prior to the start of work (including vegetation clearing or soil disturbance), the Applicant shall submit an Eastern Box Turtle Protection Plan to the Division for review and written approval. Said Plan shall detail procedures for protecting state-listed turtles during construction, and be prepared and implemented by a qualified, Division-approved wildlife biologist. The Division is available for consultation on Plan development and can provide contact information for qualified biologists. The Division-approved Plan shall be implemented as written; any proposed changes to the Plan must be submitted to the Division for review and written approval prior to implementation of said changes. By December 31st of any year in which work occurs, the qualified biologist shall submit: a) a summary report to the Division detailing project status and compliance with the Plan; and b) any observations of state-listed turtles at https://www.mass.gov/how-to/report-rare-species-vernal-pool-observations.

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DOCUMENT A00872

EVERSOURCE LICENSE AGREEMENT

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LICENSE AGREEMENT

This License Agreement (hereinafter the "License") made this 22nd of July, 2026, by **NSTAR ELECTRIC COMPANY** d/b/a **EVERSOURCE ENERGY**, a Massachusetts corporation and public utility having a place of business at 247 Station Drive, Westwood, Massachusetts 02090 (hereinafter the "Licensor"),and the **TOWN OF PROVINCETOWN**, having an address of 260 Commercial Street, Provincetown, MA 02657 (hereinafter the "Licensee").

RECITALS:

WHEREAS, Licensee owns the public way known as Shank Painter Road in the Town of Provincetown, Barnstable County, Massachusetts, (hereinafter the "Land"); and

WHEREAS, Licensor is the owner of a parcel of land located at 80 Shank Painter Road, Provincetown, adjacent to the Land, by deed recorded with the Barnstable County Registry of Deeds (the "Registry") in Book 973, Page 547 or however the same may have been acquired (the "Property"); and

WHEREAS, Licensee desires to widen and improve the Land and adjacent ways (the "Project"), and has requested Licensor to grant Licensee temporary license to use a portion of the Property for grading and driveway reconstruction purposes, which portion contains 408 square feet, more or less, and is shown more particularly as "TE-08" (the "License Area") on a plan entitled "Plan of Alterations and Easements at Shank Painter Road in Provincetown, MA (Barnstable County)", prepared by JC Engineering, Inc., a copy of which is attached hereto as Exhibit A and incorporated herein (the "Easement Plan"), and which work and/or improvements (the "Proposed Improvements") are shown on plans entitled "MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION PLAN AND PROFILE OF SHANK PAINTER ROAD IN THE TOWN OF PROVINCETOWN BARNSTABLE COUNTY", a reduced copy of which is attached hereto as Exhibit B (the "ROW Plan" and, together with the Easement Plan, the "PLANS"); and

WHEREAS, Licensor is willing to grant to Licensee permission and such a license for the purposes of constructing, using and maintaining the Proposed Improvements upon the License Area, but subject to compliance with the terms and conditions provided herein.

NOW THEREFORE, in consideration of the mutual covenants herein and intending to incorporate the foregoing recitals by reference, it is hereby agreed between the parties hereto as follows:

1.0 Subject to the terms and conditions of this License, Licensor hereby grants Licensee, its successors and assigns this conditional and revocable License to install, construct, maintain, repair, and replace (but not relocate or expand without prior written consent of Licensor) the Proposed Improvements as shown on the PLANS, within the License Area. Licensee covenants to use the License Area only for the Proposed Improvements and for no other uses. Licensee agrees that any field changes to the Proposed Improvements shall be subject to prior review and written

approval of the Licensor, which shall not be unreasonably withheld. Licensee shall always maintain the Proposed Improvements in good condition.

2.0 Licensee agrees to follow the information in a guide to work safely in the Eversource's Right of Way. The guide attached hereto and incorporated herein as Exhibit B, entitled "OPERATIONS OF EQUIPMENT ON EVERSOURCE RIGHTS OF WAY, DRAWING NO. 09000-99001". Licensee agrees that all of the Proposed Improvements shall be constructed as shown on the PLANS. All Proposed Improvements will be located within the limits of the License Area and will be designed and built to withstand a minimum of H-20 loading (latest AASHTO design truck wheel loading or equivalent), so as to permit unimpeded and safe access for Licensor's vehicles and crews across the Land to all points within the License Area.

3.0 Licensee shall ensure that all slopes within the License Area and affecting the License Area are stable and not steeper than 2:1, with an access way along the License Area not steeper than 10:1. Any clearing of vegetation within the License Area by the Licensee, its contractors or their respective employees that is within 20 feet, or has the potential to fall within 20 feet of any overhead electric conductors, shall be performed by qualified personnel trained in accordance with OSHA Standard 29 CFR Part 1910.269, as it may be amended from time to time.

4.0 No materials, including without limitation, soil, loam, peat, sand, rock, minerals, gravel, mulch, wood chips, clay or snow shall be stockpiled, excavated, removed from, or moved about the License Area, except such excavation and grading as may be required for and incidental to the performance of the Proposed Improvements. The licensee agrees to remove all construction debris and spoils from the License Area, and not to dispose of any such material within the License Area.

5.0 Licensee, for itself and its agents, employees and contractors, agrees that no truck, trailer, crane, power shovel, backhoe, front-end loader or other vehicle, machinery or equipment, or any other appurtenance or part thereof which is or may be capable of being elevated in excess of thirteen feet six inches (13'-6") above the level of the ground, shall be operated within the License Area, nor shall any machinery or equipment, object, or other appurtenance be brought or operated within ten (10) feet of any energized wire. Licensee further agrees not to place or park dumpsters, trucks, trailers or construction equipment under any overhead electric wires within the License Area.

6.0 There shall be no interference with pedestrian and vehicular access to Licensor's Facilities within the License Area. It is understood that access to Facilities includes travel along the License Area and through the License Area at any time for inspection and maintenance, and for emergency dispatch and repairs, by all manner of vehicles and on foot, and includes low-flying aircraft, and that Licensor may perform, without prior notice, any other act, including but not limited to closing the License Area, or portions thereof, to Licensee for periods of time, consistent with its obligations as a public utility.

7.0 Licensee agrees to provide Licensor with an "As-Built" plan in digital DXF format together with a full-size printed original "As- Built" plan(s) following the installation of the Proposed Improvements as shown on the PLANS within the License Area. Such plan(s) shall show the location of the License Area, Proposed Improvements, and Licensor Facilities including electric structures, and overhead wires. The As-Built plan shall also show measured tie dimensions to all structures, as "structures" are defined by the Massachusetts Building Code and shall be prepared by a Professional Land Surveyor licensed in the Commonwealth of Massachusetts.

8.0 At least forty-eight (48) hours prior to commencement of any work within the License Area, Licensee shall notify the Licensor's Manager of Substation Operations and Real Estate Department by telephone, email and in writing as set forth in Section 18.0.

9.0 By agreeing to this License, Licensor does not represent or warrant that the License Area, is appropriate, safe or suitable for the proposed use, or that such area may be used for the purposes specified herein under applicable zoning, environmental, land use, or other laws or regulations, nor does Licensor undertake to make the License Area appropriate, safe or suitable for such use, or to obtain any permits, licenses or approvals of any governmental authority which may be required to permit such use. Licensee shall obtain any and all necessary governmental permits, licenses and approvals, at its sole cost and expense, prior to the commencement of any use of the License Area and shall comply at all times with all applicable zoning, environmental, land use or other laws and regulations.

10.0 Licensee shall indemnify, defend and save harmless Licensor, its officers, employees, representatives, agents and contractors, for and from and against all third-party demands, claims, actions, damages, costs, expenses (including reasonable attorney's fees), fines, penalties, losses or liability whatsoever (including, without limitation, claims for injury to persons or damage to property) in any manner, directly or indirectly, resulting from or arising out of (a) the acts or omissions of Licensee, or its agents, contractors and invitees, and their respective employees pursuant hereto, or (b) the use of the License Area, by Licensee, its agents, contractors and invitees and their respective employees, and any failure of Licensee or its agents, contractors and invitees and their respective employees to comply with any applicable laws or regulations, or (c) any breach by Licensee, its agents, contractors and invitees and their respective employees of any provision of this License, except to the extent that any such claim or liability herein results from the negligence or willful misconduct of Licensor, or its agents and contractors, and their respective employee.

11. Before entering the Property to be begin work on the Proposed Improvements, Licensee or its contractor shall provide a Certificate of Insurance and a copy of the endorsement(s) to the policy in which NSTAR ELECTRIC COMPANY d/b/a Eversource Energy and its affiliates are designated an additional insured, and which provide minimum liability coverage as follows:

11.0 Licensee or its contractor shall procure and maintain at its expense, at all times during construction of the Proposed Improvements, general liability insurance of $4,000,000 combined per occurrence and aggregate of $4,000,000 against claims and demands of any

injury to person or property for which Licensee is responsible or construed to be responsible for hereunder. Licensor shall be named an additional insured using ISO additional insured endorsement CG 20 10 04-13 and/or CG 20 37.04-13 or their equivalents. Coverage shall include ongoing and completed operations. Limits may be provided by a combination of primary and excess liability policies.

11.1 Licensee or its contractor shall procure and maintain at its expense, at all times during the construction of the Proposed Improvements Auto liability insurance with a per accident limit of $2,000,000.00 with an aggregate limit of $2,000,000.00 on its vehicles. These limits may be provided by a combination of primary and excess liability policies. Licensor shall be named as an additional insured.

11.2 Licensee or its contractor, to the extent that Licensee is required under Massachusetts law to provide for workers' compensation for its employees, shall do so. Every Contractor and/or subcontractor working on behalf of the Licensee shall procure and maintain at its expense, at all times during installation, construction, maintenance, repair and /or replacement of the Proposed Improvements workers' compensation for its employees in an amount not less than statutory in Massachusetts, including coverage for any applicable Federal laws and regulations, and Employers Liability in the amounts of $1,000,000/$1,000,000/$1,000,000.

11.3 Each insurance policy shall be primary to NSTAR ELECTRIC COMPANY d/b/a Eversource Energy's self-insurance and insurance program and NSTAR ELECTRIC COMPANY d/b/a Eversource Energy's insurance program shall be non-contributory. All such insurance shall not limit nor otherwise alter the liability of Licensee. Licensee will provide Licensor with a copy mailed to Eversource Energy, Attn: Manager, Real Estate, 247 Station Drive, SE210, Westwood, MA 02090. Licensee shall ensure that its contractors and subcontractors procure and maintain all insurance as specified in this section. Should Licensee fail to ensure contractors and subcontractors insurance coverage, Licensee shall cover all claims arising therefrom. Licensee shall submit Certificates of Insurance and all additional insured endorsements, including copy(s) of primary and non-contributory endorsement(s) evidencing compliance with the above upon full execution of this License and thereafter upon expiration of each certificate to NSTAR ELECTRIC COMPANY d/b/a Eversource Energy's, Real Estate Manager as set forth in Section 18.0.

12.0 Licensee and its employees, agents and contractors shall always comply and under all circumstances with all Massachusetts General Laws (M.G.L. c. 166, s. 21A et seq.), OSHA and any other applicable requirements regarding work or activity in the proximity of energized electric lines. Licensee agrees that it is hereby made a condition of this License, that the use of the License Area by Licensee shall not result in the release of any oil or hazardous materials, as those terms are defined in the Massachusetts Contingency Plan, (310 CMR 40.000 et seq). In the event of any breach of the foregoing conditions by Licensee, Licensor shall, in addition to all other remedies, have the benefit of the indemnity provision set forth in Section 10.0 and the right to seek injunctive relief.

13.0 It is understood and agreed that by issuing this License, Licensor does not relinquish, diminish, waive, abandon or lessen its right to construct, install, upgrade, reconstruct, relocate and maintain existing or new electric transmission or distribution line or lines on, above and/or underground within the License Area at any time and from time to time, nor in any other manner modify or relinquish any of its rights under or within the License Area, and that such rights and the exercise thereof may require modifications or relocations of the Proposed Improvements in the future, at Licensee's sole cost and expense; provided, however, Licensor shall use reasonable efforts to avoid requiring modification or relocation of the Proposed Improvements so long as such efforts do not interfere with the operations of Licensor's Facilities. Licensor shall not be liable to Licensee for any damage to the Proposed Improvements resulting from Licensor's access and operations within the License Area unless such damage results from Licensor's negligence or willful misconduct. Licensee, for itself and its successors in title, agrees that it shall not, directly or indirectly, oppose or support those opposing, in any public or private forum, any future replacement, modification, upgrade or expansion of Licensor's Facilities within the License Area.

14.0 Licensee acknowledges and understands that mild shocks due to electrostatic currents may be felt when touching conductive structures, vehicles, and objects within the License Area. Licensee, for itself and its employees, agents, contractors, and invitees, accepts this circumstance, which is a normal condition attendant to high-voltage transmission lines, and understands that Licensor will not be able (and will not be required) to eliminate these currents.

15.0 Licensee shall not endanger, damage or interfere with any Facilities located on or within the License Area. The buried counterpoise ground wire shall remain in place. In the event of any damage to the counterpoise wire or any of the Facilities discovered during the construction process, or during use and maintenance of the Proposed Improvements, Licensee shall immediately notify Licensor's Manager of Substation Operations and the Real Estate Department by telephone, email, and in writing as set forth in Section 18.0, so that repairs can be made without delay.

16.0 Licensee shall promptly reimburse Licensor for the actual costs, as reasonably determined by Licensor, of repair or replacement of any Facilities that have been injured or damaged by Licensee, its agents, invitees, contractors, or their respective employees, in its exercise of the license and permission hereby granted.

17.0 It shall be specifically understood that, in the event there is a violation of the conditions set forth herein, or if an activity of Licensee is deemed to be unsafe or unauthorized, in the sole opinion of Licensor, Licensor shall have the right, without notice to Licensee, its successors in title, to take any and all action (including, without limitation, self-help), at Licensee's expense, as is deemed necessary to make safe or restore the License Area to an acceptable state.

18.0 Notices under this License shall be in writing and sufficient if sent by (a) facsimile, with electronic confirmation of receipt (provided that an additional copy of the notice shall be sent via first class mail, postage prepaid), or (b) by hand delivery or overnight courier delivery, in either case with written confirmation of delivery, to the following addresses:

If to Licensor:

NSTAR Electric Company d/b/a Eversource Energy
Attn: Jennifer Valente
157 Cordaville Road
Southborough, MA 01772
781-441-3227
jennifer.valente@eversource.com

And

NSTAR Electric Company d/b/a Eversource Energy
1165 Massachusetts Ave
Dorchester, Massachusetts 02125
Attn: Adam Johnson, Manager, Substation Operations
Telephone Number: 508-317-3471
Email: adamjohnson1@eversource.com

If to Licensee:

James Vincent, Director of Public Works
2 Mayflower Street
Provincetown, Massachusetts 02657
Telephone Number: 508-487-7060
Email: jvincent@provincetown-ma.gov

Such notices shall be deemed delivered when received or when delivery is refused.

19.0 The Licensor and Licensee agree to use their best efforts to cooperate in their joint use of the License Area, and to provide each other, upon reasonable request, with engineering and surveying plans, maps or other information necessary or helpful in locating or determining their respective rights within the License Area.

20.0 Any consent, express or implied, by either party, to a breach by the other party of any covenant, condition or agreement contained herein shall not constitute a waiver of any prior or succeeding breach, and the non-breaching party reserves all its rights at law or in equity.

21.0 This License contains the entire agreement of the parties with respect to the subject matter hereof. This License shall be binding on the parties and their respective successors. This License may be executed in one or more counterparts each of which when so executed and delivered shall be deemed an original and all of which, taken together, shall constitute one and the same instrument. This License can be modified only by an instrument in writing signed by both parties. The exchange of counterparts of this License and of signature pages by facsimile or other electronic transmission (including, without limitation, by scanned "PDF" transmitted by email) shall constitute effective execution and delivery of this License by the parties hereto and may be used in lieu of the original License for all purposes. Signatures of Licensor and Licensee transmitted by facsimile or other electronic means (including scanned "PDF" transmitted by email) shall be deemed to be their original signatures for all purposes.

22.0 This License shall be governed by the laws of the Commonwealth of Massachusetts and shall be specifically enforceable.

23.0 The Licensee acknowledges and agrees that neither this License nor any recording of this License with the Registry shall be or be construed to be a conveyance of any interest in the Land including, without limitation, an easement or lease, or otherwise constitute an interest or covenant that will "run with the land". This License is personal to the Licensee and is neither transferable nor assignable, unless in connection with the conveyance by Licensee of any interest in the Land and the execution by the intended transferee of an instrument in form and substance satisfactory to Licensor that such transferee shall be bound by all terms and provisions of this Agreement. Any conveyance by Licensee of any interest in the Land without strict compliance to the preceding sentence shall automatically result in the termination of this License. In the case any transfer which complies with the requirements of this Section 23.0, Licensee shall not be liable or responsible for any acts or omissions of the transferee or any breach of the provisions of this License occurring subsequent to the transfer.

24.0 This License shall commence on the date first set forth above and expire automatically five (5) years therefrom.

(Signatures on Next Page)

In Witness Whereof, the parties have caused this License to be executed as an instrument under seal by their respective duly authorized representatives as of the date and year first above written.

LICENSOR:

NSTAR ELECTRIC COMPANY d/b/a Eversource Energy

By: _____
Name: Timothy P. Powers
Title: Manager, Real Estate

In Witness Whereof, the parties have caused this License to be executed as an instrument under seal by their respective duly authorized representatives as of the date and year first above written.

LICENSEE:

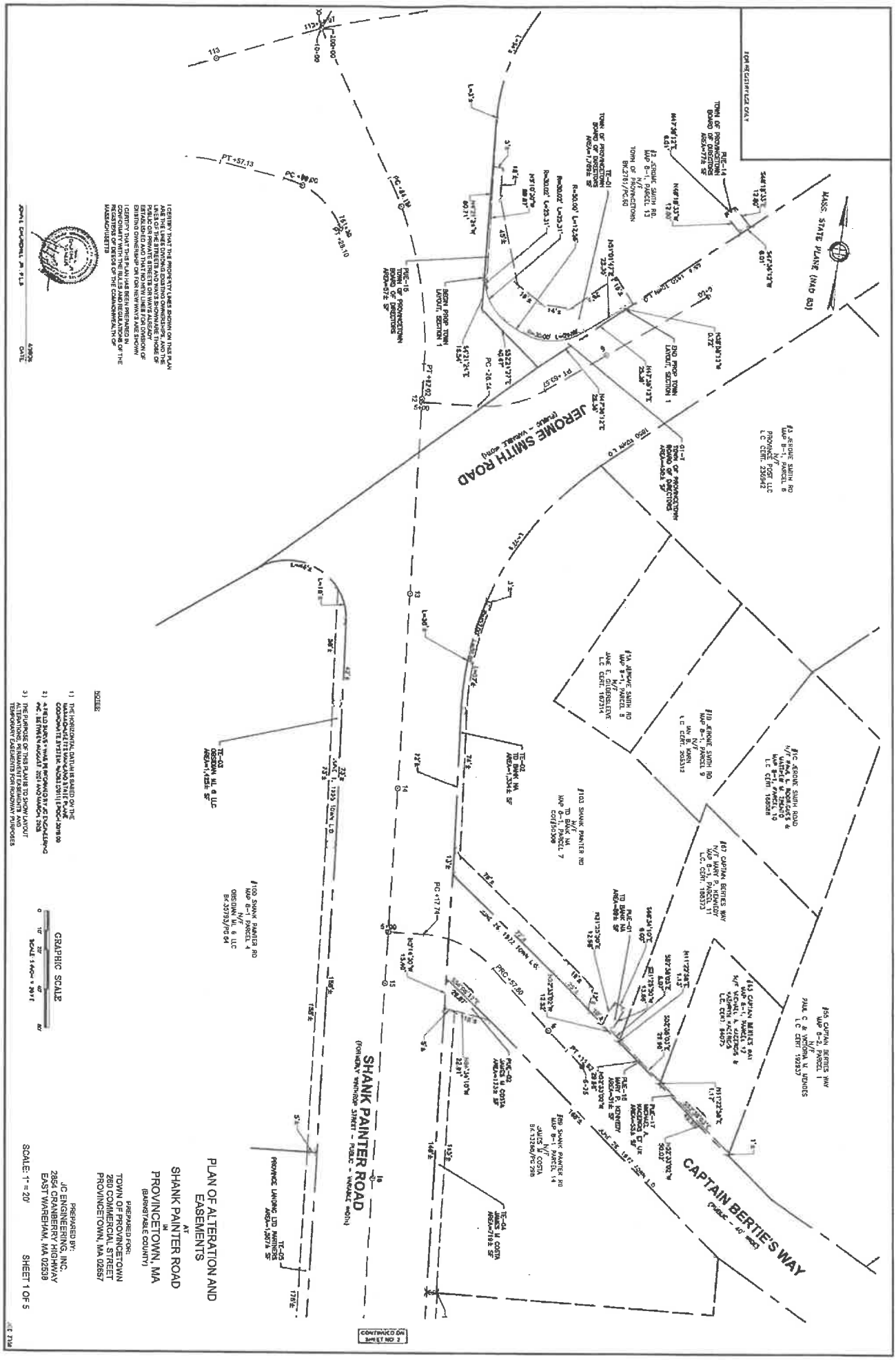
TOWN OF PROVINCETOWN

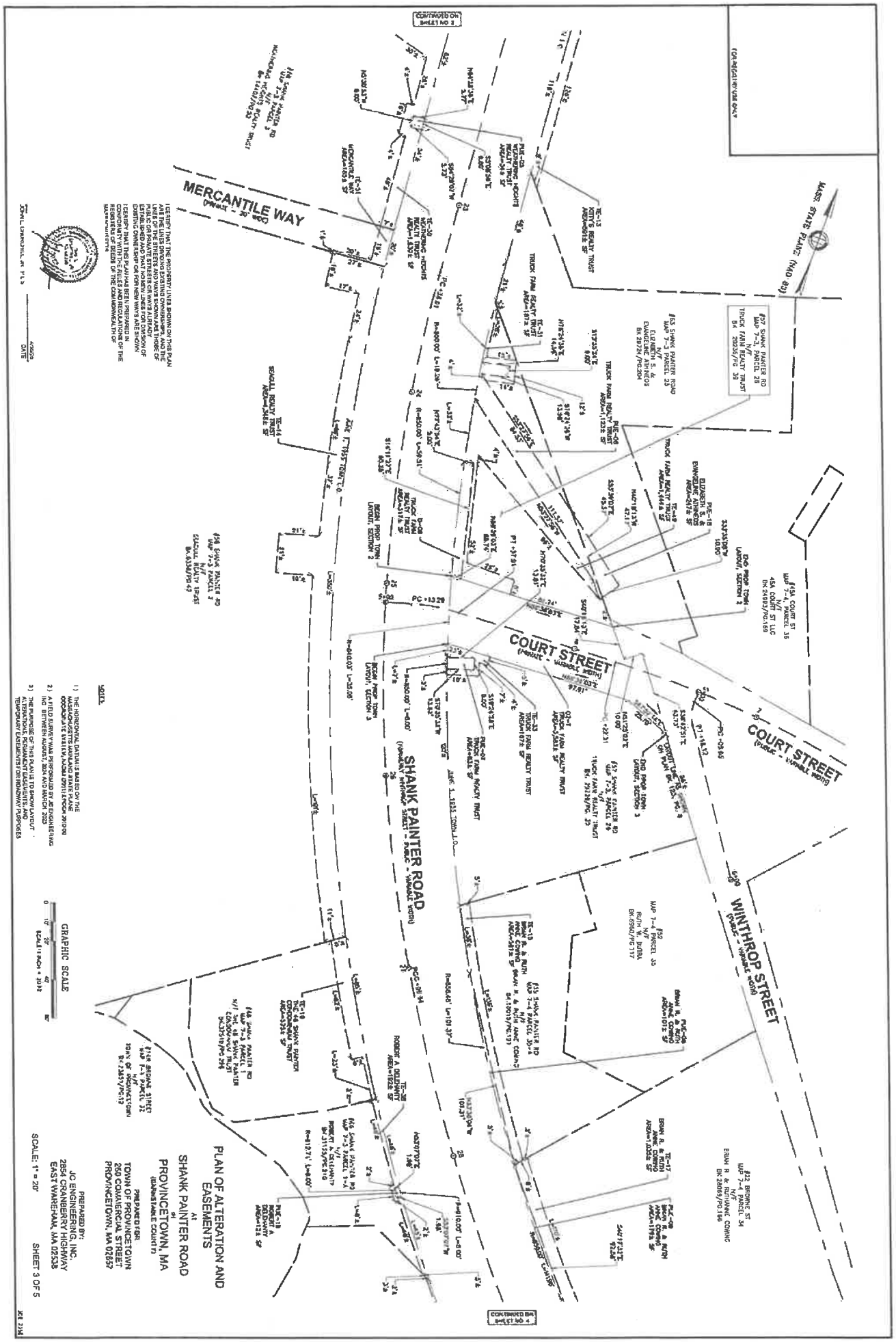
By: _____
Name: Alex Morse
Title: Town Manager

EXHIBIT A

EASEMENT PLAN

"PLAN OF ALTERATIONS AND EASEMENTS AT SHANK PAINTER ROAD IN PROVINCETOWN, MA (BARNSTABLE COUNTY)", PREPARED BY JC ENGINEERING, INC.


PLAN OF ALTERATION AND EASEMENTS
AT
SHANK PAINTER ROAD
IN
PROVINCETOWN, MA
(BARNSTABLE COUNTY)
PREPARED FOR:
TOWN OF PROVINCETOWN
260 COMMERCIAL STREET
PROVINCETOWN, MA 02657
PREPARED BY:
JC ENGINEERING, INC.
2854 CRANBERRY HIGHWAY
EAST WAREHAM, MA 02539
SCALE: 1" = 20'
SHEET 1 OF 5
SHANK PAINTER ROAD
(FORMERLY WINTHROP STREET - PUBLIC - VARIABLE WIDTH)
CAPTAIN BERTIE'S WAY
(PUBLIC - 40' WIDE)
JEROME SMITH ROAD
(PUBLIC - VARIABLE WIDTH)
MASS STATE PLANE (NAD 83)
GRAPHIC SCALE
SCALE: 1 INCH = 20 FT
NOTES:
1) THE HORIZONTAL DATUM IS BASED ON THE MASSACHUSETTS COORDINATE SYSTEM, NAD83(2011) (EPOCH 2010.00)
2) ALL BEARINGS SHOWN HEREON ARE REFERENCED TO GRID NORTH OF THE MASSACHUSETTS MAINLAND COORDINATE ZONE.
3) THE PURPOSE OF THIS PLAN IS TO SHOW LAYOUT ALTERATIONS AND TEMPORARY EASEMENTS FOR ROADWAY PURPOSES
I CERTIFY THAT THE PROPERTY LINES SHOWN ON THIS PLAN ARE THE LINES DIVIDING EXISTING OWNERSHIPS AND THAT THE LINES OF THE STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED, OR TO BE ESTABLISHED, BY THE AUTHORITY OF THE OWNERS OF THE LAND SHOWN ON SAID PLAN, AND FOR THE PURPOSE OF RECORDING ONLY AND DOES NOT SUBDIVIDE LAND WITHIN THE MEANING OF THE SUBDIVISION CONTROL LAW OR CREATE BUILDING LOTS
I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMITY WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS
CONTINUED ON SHEET NO. 2


MERCANTILE WAY
(PRIVATE - 30' WIDE)
COURT STREET
(PUBLIC - VARIABLE WIDTH)
SHANK PAINTER ROAD
(PUBLIC - VARIABLE WIDTH)
WINTHROP STREET
(PUBLIC - VARIABLE WIDTH)
MASS STATE PLANE (NAD 83)
#57 SHANK PAINTER RD
MAP 7-3, PARCEL 28
TRUCK FARM REALTY TRUST
BK 29235/PG 38
#53 SHANK PAINTER ROAD
MAP 7-3 PARCEL 23
N/F
ELIZABETH S. & EVANGELINE ATHANIOS
BK 29726/PG204
#58 SHANK PAINTER RD
MAP 7-3 PARCEL 2
SEAGULL REALTY TRUST
BK 6334/PG 42
#45A COURT ST
MAP 7-4 PARCEL 36
N/F
45A COURT ST LLC
BK 24983/PG 169
#52 BROWNE ST
MAP 7-4 PARCEL 34
N/F
BRIAN R & RUTHANNE CONNO
BK 28059/PG 146
#49 SHANK PAINTER RD
MAP 7-4 PARCEL 30
N/F
BRIAN R. & RUTH ANNE CONNO
BK 16019/PG 191
#50
MAP 7-4 PARCEL 35
N/F
Ruth W. DUTRA
BK 6990/PG 117
#48 SHANK PAINTER RD
MAP 7-3 PARCEL 26
N/F
TRUCK FARM REALTY TRUST
BK 7231/PG 25
#149 BROWNE STREET
MAP 7-4 PARCEL 32
100% OF PROVINCETOWN
BK 2451/PG 112
#46 SHANK PAINTER RD
MAP 7-3 PARCEL 1-A
N/F
ROBERT A. DELEHANTY
BK 31125/PG 210
TC-1 TRUCK FARM REALTY TRUST AREA=3,558± SF
TC-2 TRUCK FARM REALTY TRUST AREA=1,078± SF
TC-3 TRUCK FARM REALTY TRUST AREA=1,123± SF
TC-4 TRUCK FARM REALTY TRUST AREA=1,446± SF
TC-5 TRUCK FARM REALTY TRUST AREA=1,317± SF
TC-6 SEAGULL REALTY TRUST AREA=344± SF
TC-7 TRUCK FARM REALTY TRUST AREA=1,232± SF
TC-8 TRUCK FARM REALTY TRUST AREA=1,317± SF
TC-9 TRUCK FARM REALTY TRUST AREA=1,446± SF
TC-10 BRIAN R. & RUTH ANNE CONNO AREA=1,035± SF
TC-11 TRUCK FARM REALTY TRUST AREA=1,078± SF
TC-12 TRUCK FARM REALTY TRUST AREA=1,232± SF
TC-13 KITY'S REALTY TRUST AREA=691± SF
TC-14 SEAGULL REALTY TRUST AREA=344± SF
TC-15 TRUCK FARM REALTY TRUST AREA=1,317± SF
TC-16 TRUCK FARM REALTY TRUST AREA=1,446± SF
TC-17 BRIAN R. & RUTH ANNE CONNO AREA=1,035± SF
TC-18 BRIAN R. & RUTH ANNE CONNO AREA=1,078± SF
TC-19 BRIAN R. & RUTH ANNE CONNO AREA=1,232± SF
TC-20 TRUCK FARM REALTY TRUST AREA=1,558± SF
TC-21 TRUCK FARM REALTY TRUST AREA=1,078± SF
TC-22 TRUCK FARM REALTY TRUST AREA=1,232± SF
TC-23 TRUCK FARM REALTY TRUST AREA=1,317± SF
TC-24 TRUCK FARM REALTY TRUST AREA=1,446± SF
TC-25 TRUCK FARM REALTY TRUST AREA=1,317± SF
TC-26 TRUCK FARM REALTY TRUST AREA=1,446± SF
TC-27 TRUCK FARM REALTY TRUST AREA=1,232± SF
TC-28 TRUCK FARM REALTY TRUST AREA=1,078± SF
TC-29 TRUCK FARM REALTY TRUST AREA=1,232± SF
TC-30 WORCESTER HEIGHTS REALTY TRUST AREA=1,558± SF
TC-31 WORCESTER HEIGHTS REALTY TRUST AREA=1,078± SF
TC-32 WORCESTER HEIGHTS REALTY TRUST AREA=1,232± SF
TC-33 TRUCK FARM REALTY TRUST AREA=1,078± SF
TC-34 TRUCK FARM REALTY TRUST AREA=1,232± SF
TC-35 TRUCK FARM REALTY TRUST AREA=1,317± SF
TC-36 TRUCK FARM REALTY TRUST AREA=1,446± SF
TC-37 TRUCK FARM REALTY TRUST AREA=1,317± SF
TC-38 TRUCK FARM REALTY TRUST AREA=1,446± SF
TC-39 ROBERT A. DELEHANTY AREA=1,828 SF
TC-40 THE 46 SHANK PAINTER ROAD NOMINEE TRUST AREA=3,328 SF
PUE-01 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-02 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-03 WORCESTER HEIGHTS REALTY TRUST AREA=1,828 SF
PUE-04 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-05 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-06 BRIAN R. & RUTH ANNE CONNO AREA=1,828 SF
PUE-07 BRIAN R. & RUTH ANNE CONNO AREA=1,828 SF
PUE-08 ROBERT A. DELEHANTY AREA=1,828 SF
PUE-09 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-10 ELIZABETH S. & EVANGELINE ATHANIOS AREA=2,828 SF
PUE-11 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-12 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-13 WORCESTER HEIGHTS REALTY TRUST AREA=1,828 SF
PUE-14 WORCESTER HEIGHTS REALTY TRUST AREA=1,828 SF
PUE-15 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-16 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-17 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-18 TRUCK FARM REALTY TRUST AREA=1,828 SF
PUE-19 TRUCK FARM REALTY TRUST AREA=1,828 SF

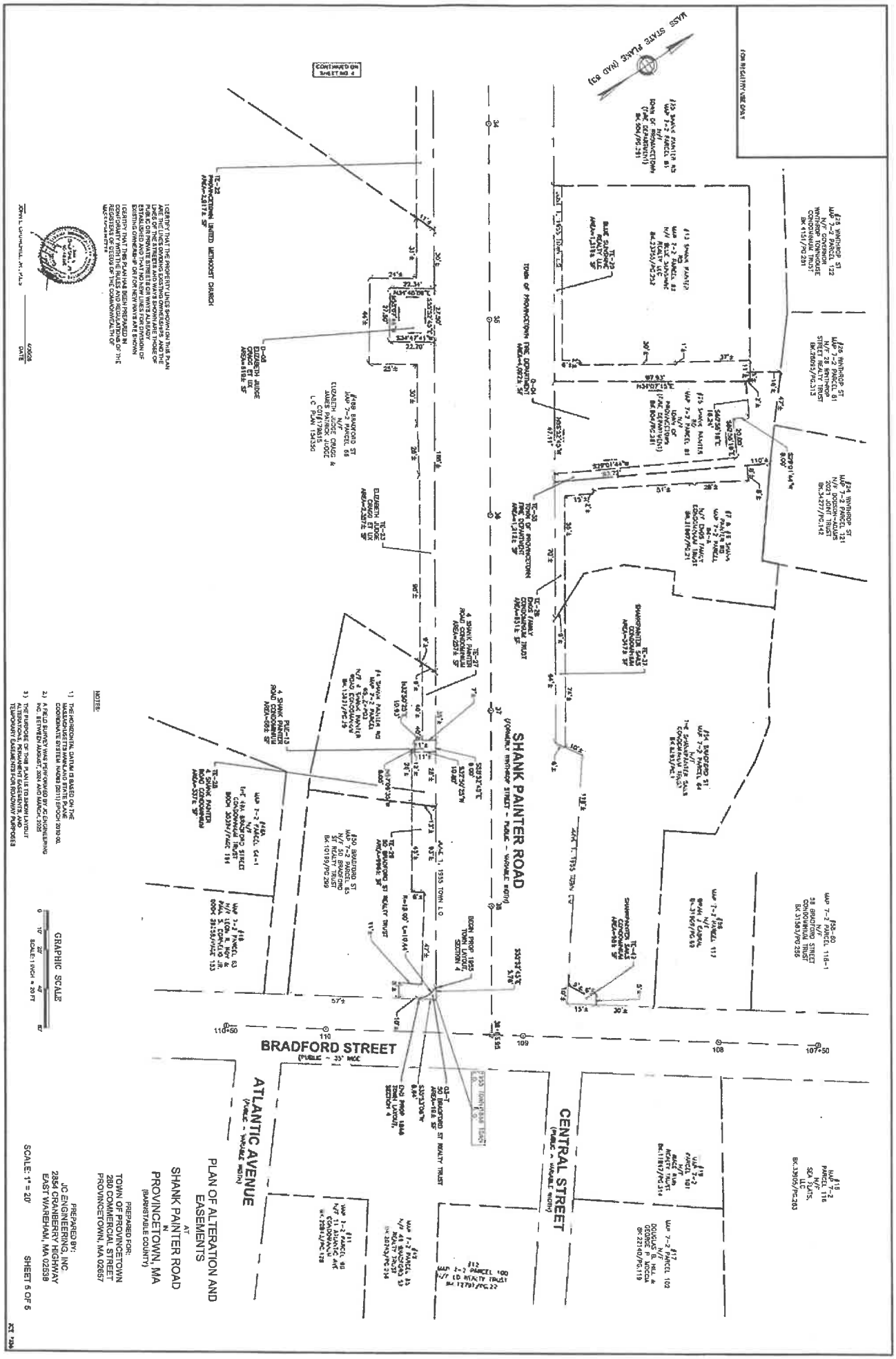
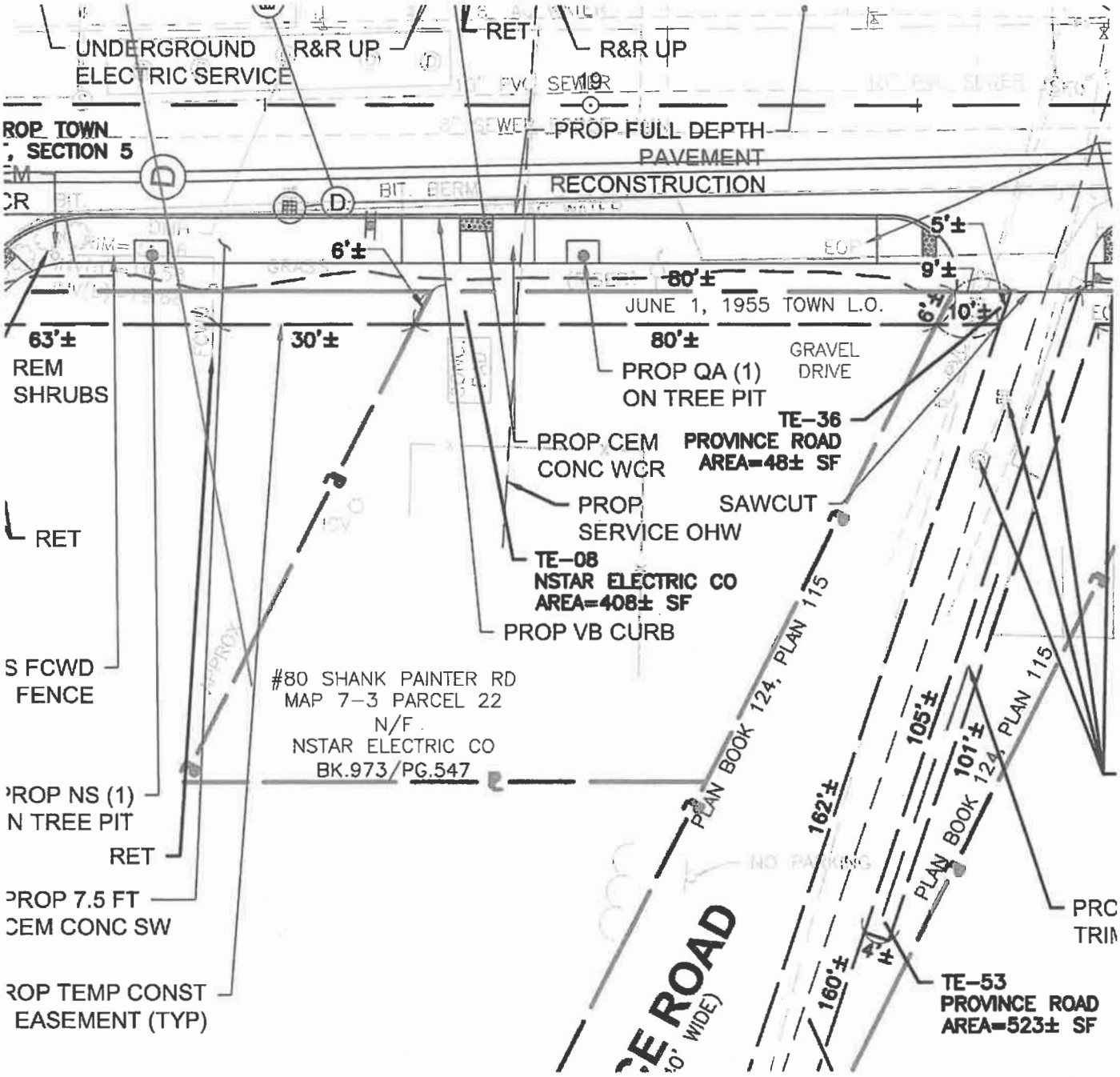

SHANK PAINTER ROAD
(PUBLIC - VARIABLE WIDTH)
BRADFORD STREET
(PUBLIC ~ 35' WIDE)
ATLANTIC AVENUE
(PUBLIC - VARIABLE WIDTH)
CENTRAL STREET
(PUBLIC - VARIABLE WIDTH)
MASS STATE PLANE (NAD 83)
GRAPHIC SCALE
SCALE: 1 INCH = 20 FT
PLAN OF ALTERATION AND EASEMENTS
AT
SHANK PAINTER ROAD
IN
PROVINCETOWN, MA
(BARNSTABLE COUNTY)
PREPARED FOR:
TOWN OF PROVINCETOWN
260 COMMERCIAL STREET
PROVINCETOWN, MA 02657
PREPARED BY:
JC ENGINEERING, INC.
2864 CRANBERRY HIGHWAY
EAST WAREHAM, MA 02538
SCALE: 1" = 20'
SHEET 5 OF 5
NOTES:
1) THE HORIZONTAL DATUM IS BASED ON THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM NAD83 (2011) EPOCH 2010.00.
2) A FIELD SURVEY WAS PERFORMED BY JC ENGINEERING INC. BETWEEN AUGUST, 2024 AND MARCH, 2025
3) THE PURPOSE OF THIS PLAN IS TO SHOW LAYOUT ALTERATIONS, PERMANENT EASEMENTS, AND TEMPORARY EASEMENTS FOR ROADWAY PURPOSES
I CERTIFY THAT THE PROPERTY LINES SHOWN ON THIS PLAN ARE THE LINES DIVIDING EXISTING OWNERSHIP FROM PUBLIC OR PRIVATE STREET OR WAYS ALREADY ESTABLISHED FROM THE RECORDS OF THE LOCALITY AND DIVISIONS OF EXISTING OWNERSHIP OR FOR NEW WAYS ARE SHOWN
I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMITY WITH THE RULES AND REGULATIONS OF THE REGISTERS OF THE COMMONWEALTH OF
JOHN L. LAROCHELLE, JR., PLS
DATE
CONTINUED ON SHEET NO. 4
FOR REGISTRY USE ONLY
#24 WINTHROP ST MAP 7-2 PARCEL 122 N/F GOVERNOR WINTHROP HOUSE CONDOMINIUM TRUST BK 4151/PG 291
#23 WINTHROP ST MAP 7-2 PARCEL 81 N/F PROVINCETOWN HOUSING AUTHORITY BK 28053/PG 313
#23 SHANK PAINTER RD MAP 7-2 PARCEL 81 N/F TOWN OF PROVINCETOWN (PAC DEPARTMENT) BK 504/PG 341
#23 SHANK PAINTER RD MAP 7-2 PARCEL 81 N/F BLUE SUNSHINE REALTY LLC BK 33565/PG 254
#24 WINTHROP ST MAP 7-2 PARCEL 121 N/F 24 WINTHROP HOUSE CONDOMINIUM TRUST BK 3427/PG 142
#23 SHANK PAINTER RD MAP 7-2 PARCEL 81 N/F TOWN OF PROVINCETOWN (PAC DEPARTMENT) BK 504/PG 341

EXHIBIT B

ROW PLAN

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION PLAN AND PROFILE OF SHANK PAINTER ROAD IN THE TOWN OF PROVINCETOWN BARNSTABLE COUNTY"



80 SHANK PAINTER ROAD
NTS

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DOCUMENT A00875

POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-001
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Off-Site Stockpiling of Soil from MassDOT Construction Projects

Purpose

The purpose of this Policy Directive is to formally establish a policy and procedures for managing and stockpiling soil generated and transported from MassDOT construction projects. This Policy Directive does not supersede any Federal, State, or Local regulations.

Date of Effect

This Policy Directive is effective immediately for all projects, including active construction projects.

For active construction projects and for other projects advertised prior to October 15, 2022, changes to the contract documents needed to implement the requirements of this Policy Directive will be considered on a case-by-case basis and shall be approved by the District Highway Director, as necessary.

For projects advertised on or after October 15, 2022, MassDOT will include the requirements and implementation procedures of this Policy Directive in the construction contract documents.

Policy Requirements

This policy is intended to prevent the off-site relocation of excavated soil generated from MassDOT projects to areas near residential receptors and to control potential fugitive dusts and/or contaminants. To that end, excavated soil may not be moved from the project site without knowledge of the content of the material. Knowledge may include visual field observations for presence of staining, odor, and/or debris, screening with a photoionization detector (PID), laboratory analysis, and/or site history. Pavement millings and other non-soil materials are not subject to the requirements of this Policy Directive.

Moving soil from a MassDOT project site to a temporary off-site storage location must be approved in writing by the District Highway Director.

The Contractor must select a storage location that is at least 500 feet away from residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially

zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.

Temporary off-site storage of excavated soil from a MassDOT project is only permissible at a location approved and permitted by MassDOT. The temporary storage location should be located within the same municipality where the soil was excavated, where possible. Stockpiled soil must be securely covered, and appropriate measures must be taken to minimize fugitive dust and erosion.

Signs indicating the source of the soil, the date the soil was generated, and contact information must be erected and maintained until the stockpiled soils are transported to a disposal facility or reused on the project site.

Implementation Procedures

To ensure that off-site storage of excavated soils is managed properly on MassDOT projects, this policy requires the following:

1. **Off-Site Stockpile Storage Locations**
    a. The Contractor shall provide proposed off-site storage locations to the Engineer for approval at least 30 days prior to transporting soil off site. Off-site storage locations should be in the same municipality as the work site.
    b. The Contractor shall keep excavated soil on site until adequately characterized to the satisfaction of the Engineer.
    c. The Contractor shall provide notification of the approved off-site storage location to the local Board of Health and the Town Manager's/Mayor's Office at least 7-days prior to transporting soil off site.
    d. The Contractor shall provide the Engineer with at least 3-days' notice prior to transporting soil off site.
    e. For off-site storage locations on MassDOT property, the Contractor is required to obtain an Access Permit through the District Permits Office prior to storage of soil or other materials. MassDOT will issue these permits at no cost to the Contractor. Information to be submitted by the Contractor as part of the permit application shall include:
        i. A description of material to be stored off-site, including available analytical data;
        ii. A figure of the location with distances to residences and residential receptors; and
        iii. Anticipated duration of temporary storage.
    f. Stockpile locations should not be within 500 feet of residential receptors (e.g., residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities).
        i. If the stockpile location must be within 500 feet of residential receptors, then soil must be less than RCS-1 (per 310 CMR 40.1600) and free of potentially hazardous or regulated items.

g. For off-site storage locations on non-MassDOT property, the Contractor must notify the property owner(s) at least 7 days prior to transporting material.
h. Exceptions to these rules will be reviewed by MassDOT and may be approved by the District Highway Director on a case-by-case basis.

2. Off-Site Stockpile Management

a. The Contractor shall keep soil stockpiles on impermeable surfaces (e.g., asphalt or concrete) or on 10-mil polyethylene sheeting.
b. The Contractor shall cover soil stockpiles with 10-mil polyethylene sheeting and surround with a berm made of hay bales, straw wattles, or similar.
    i. Piles that are actively being worked on must be covered and re-secured at the end of the work shift.
c. The Contractor shall label stockpiles with signs, including:
    i. Location of origin (including any Release Tracking Numbers)
    ii. Stockpile ID number (including MassDOT District office-assigned tracking ID, if different)
    iii. Date of initial accumulation
    iv. Applicable telephone numbers for the Contractor and MassDOT.
d. The Contractor shall mitigate fugitive dust at storage locations under the direction of an appropriately trained/certified environmental professional.
e. The Contractor shall remedy noncompliance with this policy within 48 hours.
f. The Contractor shall remedy noncompliance with this policy on the SAME DAY for potentially hazardous material, as determined by the Engineer.
g. The Contractor shall handle excavated soil according to federal, state, and local regulations.
h. The Contractor shall use appropriate shipping documents for all movements of excavated soil on public roadways (e.g., Bill of Lading, Material Shipping Record, Manifest, Asbestos Waste Shipment Record, etc.).

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-002
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Use of MassDOT Property for Staging and other Construction-Related Operations

Purpose

This Policy Directive is intended to address the use of MassDOT property by MassDOT Contractors for construction staging and other construction-related operations that are not specifically defined in the construction contract. Such use of MassDOT property will only be allowed if permitted by the District Office in accordance with 700 CMR 13.00, Approval of Access to MassDOT Highways and Other Property. This includes the use of MassDOT property for staging, laydown, and storage of equipment and materials, including soil excavated from a project site.

This Policy Directive requires the Contractor/applicant to obtain a Non-Vehicular Access Permit from MassDOT to use MassDOT property for these purposes.

This Policy Directive is effective immediately and applies to all MassDOT construction projects.

General Permit Considerations and Conditions

In addition to other normal MassDOT Access Permit procedures, MassDOT shall consider the following during the application, review, implementation and monitoring processes of Access Permits required by this Policy Directive:

- Storage and placement of the Contractor's equipment and materials should not be allowed within the clear zone of the roadway.
- Stockpiled soils should not be located within 500 feet of residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.
- The Contractor/applicant shall identify the access/egress locations of the proposed storage areas. MassDOT will only approve locations determined to be safe for roadway users, construction workers and the general public.
- The Contractor may be required to submit a Traffic Management Plan and/or Lighting Plan for MassDOT review and approval as part of the permit application, depending on the proposed use of the area.

- The Contractor shall submit the permit application through MassDOT's online State Highway Access Permit System (SHAPS).
- MassDOT will waive the permit application fee for any application received from a MassDOT Contractor for any permit required by this Policy Directive and will waive any subsequent amendment and extension fees that may otherwise be required.
- MassDOT will review the permit application in accordance with applicable standard procedures and will apply standard permit terms and conditions, as necessary.
- The Resident Engineer will verify that the permit is approved before allowing the Contractor to use the affected area for the requested purpose.
- Areas permitted are for use by the approved applicant only and are not to be shared with or used by other vendors. Subcontractors specifically engaged with the applicant working on the specific MassDOT project will be allowed to use the area in accordance with the terms of the permit.
- Permits are issued on an annual basis and will require the Contractor to file for an extension each year to continue use.

Exemptions from Permit Requirements

Equipment and materials being used for active construction operations and located within the work zone of the construction contract are exempt from this permit requirement, provided they do not interfere with the safety or operation of the roadway or the work zone. Examples of these types of exempt uses are:

- Equipment and materials parked or stored within a protected (barriered) work zone.
- Materials placed in the work zone prior to same-day installation or use.
- Soils excavated temporarily and scheduled to be replaced, such as for trenching operations or for installation of drainage structures.

DOCUMENT B00420

PROPOSAL

PROVINCETOWN

For: **Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of PROVINCETOWN in Barnstable County, in the Commonwealth of Massachusetts, and is shown by the locus map (Document 00331) in the Proposal Pamphlet, the work locations extend as follows:

Route 6

Beginning – Station70+75.00+/-
Ending Station - 517+75+/-
Ending Station - 204+10+/-

Shank Painter Road

Ending – Station 38+54.00+/-

The contract prices shall include the furnishing of all materials (except as otherwise herein specified), the performing of all the labor requisite or proper, the providing of all necessary machinery, tools, apparatus and other means of construction, the doing of all the abovementioned work in the manner set forth, described and shown in the specifications and on the drawings for the work, and in the form of contract, and the completion thereof within **1823 CALENDAR DAYS** upon receipt of a Notice to Proceed, except that if the completion date falls between December 1 and March 15 then the same number of days beyond December 1st will be extended after March 15th.

Summer Shutdown: No work shall be allowed on any roadway between Memorial Day and Labor Day without prior written approval of the Engineer and the Town.

The Work of this project is described by the following Items and quantities.

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Project # 608744	Contract # 136412			
Location : PROVINCETOWN				
Description : Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
101.	1	CLEARING AND GRUBBING AT _____ PER ACRE		
102.2	1	TREE TRIMMING AT _____ LUMP SUM		
102.511	18	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.521	435	TREE AND PLANT PROTECTION FENCE AT _____ PER FOOT		
102.55	80	ARBORIST AT _____ PER HOUR		
103.	17	TREE REMOVED - DIAMETER UNDER 24 INCHES AT _____ EACH		
104.	2	TREE REMOVED - DIAMETER 24 INCHES AND OVER AT _____ EACH		
120.1	16,018	UNCLASSIFIED EXCAVATION AT _____ PER CUBIC YARD		
141.	2,170	CLASS A TRENCH EXCAVATION AT _____ PER CUBIC YARD		

Project # 608744	Contract # 136412			
Location : PROVINCETOWN				
Description : Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
141.1	276	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
142.	160	CLASS B TRENCH EXCAVATION AT _____ PER CUBIC YARD		
144.	70	CLASS B ROCK EXCAVATION AT _____ PER CUBIC YARD		
146.	55	DRAINAGE STRUCTURE REMOVED AT _____ EACH		
151.	7,964	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.2	891	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ PER CUBIC YARD		
154.	330	SAND BORROW AT _____ PER CUBIC YARD		
156.	746	CRUSHED STONE AT _____ PER TON		
170.	33,559	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		

Project # 608744	Contract # 136412			
Location : PROVINCETOWN				
Description : Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		
180.02	80	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		
180.03	50	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		
181.11	22,000	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		
181.12	4,600	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		
181.13	1,410	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		
181.14	290	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
182.1	1	INSPECTION AND TESTING FOR ASBESTOS AT _____ LUMP SUM		
182.2	32	REMOVAL OF ASBESTOS AT _____ PER FOOT		

Project # 608744	Contract # 136412			
Location : PROVINCETOWN				
Description : Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
201.	41	CATCH BASIN AT _____ EACH		
202.	25	MANHOLE AT _____ EACH		
202.2	3	MANHOLE (9 TO 14 FOOT DEPTH) AT _____ EACH		
203.1	1	STILLING BASIN AT _____ EACH		
203.2	1	OVERFLOW STRUCTURE AT _____ EACH		
203.3	2	HYDRODYNAMIC SEPARATORS AT _____ EACH		
203.4	1	WATER LEVEL MONITORING SYSTEM AT _____ LUMP SUM		
204.	4	GUTTER INLET AT _____ EACH		
205.	4	LEACHING BASIN AT _____ EACH		

Project # 608744	Contract # 136412			
Location : PROVINCETOWN				
Description : Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
205.5	740	INFILTRATION CHAMBERS AT _____ PER LINEAR FOOT		
220.	34	DRAINAGE STRUCTURE ADJUSTED AT _____ EACH		
220.2	20	DRAINAGE STRUCTURE REBUILT AT _____ PER FOOT		
220.3	1	DRAINAGE STRUCTURE CHANGE IN TYPE AT _____ EACH		
220.5	5	DRAINAGE STRUCTURE REMODELED AT _____ EACH		
220.6	15	SANITARY STRUCTURE REBUILT AT _____ PER FOOT		
220.7	19	SANITARY STRUCTURE ADJUSTED AT _____ EACH		
220.8	2	SANITARY STRUCTURE REMODELED AT _____ EACH		
222.3	80	FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD AT _____ EACH		

Project # 608744	Contract # 136412			
Location : PROVINCETOWN				
Description : Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
223.1	55	FRAME AND GRATE (OR COVER) REMOVED AND STACKED AT _____ EACH		
227.3	73	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT AT _____ PER CUBIC YARD		
227.31	1,633	REMOVAL OF DRAINAGE PIPE SEDIMENT AT _____ PER FOOT		
227.4	20	MASONRY PLUG AT _____ PER SQUARE FOOT		
241.12	1,415	12 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
241.15	917	15 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
241.18	729	18 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
241.24	356	24 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
242.18	1	18 INCH REINFORCED CONCRETE PIPE FLARED END AT _____ EACH		

Project # 608744	Contract # 136412			
Location : PROVINCETOWN				
Description : Corridor Improvements and Related Work on Shank Painter Road, from Route 6 to Bradford Street				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
244.12	123	12 INCH REINFORCED CONCRETE PIPE CLASS V AT _____ PER FOOT		
245.16	1,120	16 INCH POLYVINYL CHLORIDE C900 PIPE AT _____ PER FOOT		
258.1	9	STONE FOR DRAINAGE OUTLETS AT _____ PER SQUARE YARD		
303.06	18	6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT) AT _____ PER FOOT		
309.	132	DUCTILE IRON FITTINGS FOR WATER PIPE AT _____ PER POUND		
350.06	5	6 INCH GATE AND GATE BOX AT _____ EACH		
357.06	5	6 INCH GATE BOX AT _____ EACH		
358.	38	GATE BOX ADJUSTED AT _____ EACH		
376.2	2	HYDRANT - REMOVED AND RESET AT _____ EACH		

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376.5	5	HYDRANT - ADJUSTED AT _____ EACH		
381.	5	SERVICE BOX AT _____ EACH		
381.3	26	SERVICE BOX ADJUSTED AT _____ EACH		
402.	1,668	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ PER CUBIC YARD		
415.1	2,242	PAVEMENT STANDARD MILLING AT _____ PER SQUARE YARD		
431.	3,796	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE AT _____ PER SQUARE YARD		
443.	82	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		
450.23	3,820	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5) AT _____ PER TON		
450.31	1,811	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5) AT _____ PER TON		

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450.42	2,880	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		
450.52	31	SUPERPAVE LEVELING COURSE - 9.5 (SLC - 9.5) AT _____ PER TON		
450.53	216	SUPERPAVE LEVELING COURSE - 12.5 (SLC - 12.5) AT _____ PER TON		
451.	370	HMA FOR PATCHING AT _____ PER TON		
452.	4,456	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		
453.	14,460	HMA JOINT ADHESIVE AT _____ PER FOOT		
470.2	18,250	HOT MIX ASPHALT BERM, TYPE A - MODIFIED AT _____ PER FOOT		
472.	1,757	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
477.	4,528.7	MILLED RUMBLE STRIP (TYPE A) AT _____ PER FOOT		

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482.5	29,240	SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING AT _____ PER FOOT		
503.	29	GRANITE CURB TYPE VA3 - STRAIGHT AT _____ PER FOOT		
506.	3,816	GRANITE CURB TYPE VB - STRAIGHT AT _____ PER FOOT		
506.1	724	GRANITE CURB TYPE VB - CURVED AT _____ PER FOOT		
506.2	4	GRANITE CURB TYPE VB - SPLAYED END AT _____ EACH		
507.1	290	GRANITE CURB TYPE T-100 - CURVED AT _____ PER FOOT		
509.	494	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT AT _____ PER FOOT		
509.1	373	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - CURVED AT _____ PER FOOT		
514.	29	GRANITE CURB INLET - STRAIGHT AT _____ EACH		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
516.	27	GRANITE CURB CORNER TYPE A AT _____ EACH		
580.	100	CURB REMOVED AND RESET AT _____ PER FOOT		
590.	410	CURB REMOVED AND STACKED AT _____ PER FOOT		
620.13	150	GUARDRAIL, TL-3 (SINGLE FACED) AT _____ PER FOOT		
620.131	132	GUARDRAIL, DEEP POST (SINGLE FACED) AT _____ PER FOOT		
627.1	2	TRAILING ANCHORAGE AT _____ EACH		
627.82	2	GUARDRAIL TANGENT END TREATMENT, TL-2 AT _____ EACH		
627.83	1	GUARDRAIL TANGENT END TREATMENT, TL-3 AT _____ EACH		
630.1	688	HIGHWAY GUARD REMOVED AND STACKED AT _____ PER FOOT		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
645.172	305	72 INCH CHAIN LINK FENCE (PIPE TOP RAIL) VINYL COATED (LINE POST OPTION) AT _____ PER FOOT		
652.072	4	72 INCH CHAIN LINK FENCE END POST AT _____ EACH		
653.072	29	72 INCH CHAIN LINK FENCE CORNER OR INTERMEDIATE BRACE POST AT _____ EACH		
657.	400	TEMPORARY FENCE AT _____ PER FOOT		
666.	55	CHAIN LINK FENCE REMOVED AND RESET AT _____ PER FOOT		
670.	20	FENCE REMOVED AND RESET AT _____ PER FOOT		
685.	50	STONE MASONRY WALL IN CEMENT MORTAR AT _____ PER CUBIC YARD		
697.1	75	SILT SACK AT _____ EACH		
698.3	160	GEOTEXTILE FABRIC FOR SEPARATION AT _____ PER SQUARE YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
701.	2,113	CEMENT CONCRETE SIDEWALK AT _____ PER SQUARE YARD		
701.1	1,316	CEMENT CONCRETE SIDEWALK AT DRIVEWAYS AT _____ PER SQUARE YARD		
701.2	446	CEMENT CONCRETE PEDESTRIAN CURB RAMP AT _____ PER SQUARE YARD		
701.3	470	STAMPED CEMENT CONCRETE TRUCK APRON AT _____ PER SQUARE YARD		
702.	490	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		
702.1	562	FLEXIBLE POROUS PAVEMENT FOR TREE PIT AREAS AT _____ PER SQUARE FOOT		
702.2	12	HOT MIX ASPHALT BICYCLE CURB RAMP AT _____ PER TON		
706.	13	BRICK WALK AT _____ PER SQUARE YARD		
706.7	85	SEASHELL WALKWAY OR DRIVEWAY REMOVED AND RESET AT _____ PER SQUARE YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
706.8	17	MISCELLANEOUS SURFACE WALKWAY OR DRIVEWAY REMOVED AND RESET AT _____ PER SQUARE YARD		
707.15	1	PARK BENCH REMOVED AND RESET AT _____ EACH		
707.16	1	BIKE RACK REMOVED AND RESET AT _____ EACH		
711.	10	BOUND REMOVED AND RESET AT _____ EACH		
715.	8	RURAL MAILBOX REMOVED AND RESET AT _____ EACH		
722.2	1	SCHEDULE OF OPERATIONS (TYPE B) - FIXED PRICE $90000 AT Ninety Thousand Dollars LUMP SUM	$90,000.00	$90,000.00
740.	36	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		
748.	1	MOBILIZATION AT _____ LUMP SUM		
751.	1,082	LOAM FOR ROADSIDES AT _____ PER CUBIC YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
751.1	161	LOAM FOR LAWNS AT _____ PER CUBIC YARD		
751.7	40	COMPOST BLANKET AT _____ PER CUBIC YARD		
754.23	1	EASTERN BOX TURTLE (TERRAPENE CAROLINA) PROTECTION PLAN AT _____ LUMP SUM		
755.45	12	WETLAND RESTORATION AT _____ PER SQUARE YARD		
755.75	40	WETLAND SPECIALIST AT _____ PER HOUR		
755.76	1	WETLANDS MONITORING REPORTS AT _____ LUMP SUM		
756.	1	NPDES STORMWATER POLLUTION PREVENTION PLAN AT _____ LUMP SUM		
765.21	47	ANNUAL COVER CROP FOR NATIVE SEEDING AT _____ PER POUND		
765.412	154	SHORT GRASSLAND MIX - SANDY SOILS AT _____ PER POUND		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
765.635	7,436	NATIVE SEEDING AND ESTABLISHMENT AT _____ PER SQUARE YARD		
765.664	7,436	MOWING FOR NATIVE SEED ESTABLISHMENT AT _____ PER SQUARE YARD		
767.121	1,176	SEDIMENT CONTROL BARRIER AT _____ PER FOOT		
767.6	133	AGED PINE BARK MULCH AT _____ PER CUBIC YARD		
767.9	1,180	JUTE MESH AT _____ PER SQUARE YARD		
769.	162	PAVEMENT MILLING MULCH UNDER GUARD RAIL AT _____ PER FOOT		
776.543	5	MAPLE - RED - OCTOBER GLORY 2-2.5 INCH CALIPER AT _____ EACH		
777.328	13	OAK - WHITE 2-2.5 INCH CALIPER AT _____ EACH		
779.328	15	ELM - PRINCETON 2-2.5 INCH CALIPER AT _____ EACH		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
783.467	16	TUPELO 2-2.5 INCH CALIPER AT _____ EACH		
794.803	100	SWEETFERN #1 AT _____ EACH		
795.155	20	WINTERBERRY - FEMALE 18-24 INCH / #1 AT _____ EACH		
796.201	120	LITTLE BLUESTEM - 1 GAL AT _____ EACH		
796.471	4,250	BEACHGRASS - AMERICAN BARE ROOT AT _____ EACH		
801.42	60	4 INCH ELECTRICAL CONDUIT - TYPE NM (DOUBLE) AT _____ PER FOOT		
804.2	220	2 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC (UL) AT _____ PER FOOT		
804.3	1,300	3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) AT _____ PER FOOT		
811.22	17	ELECTRIC HANDHOLE - SD2.022 AT _____ EACH		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
812.10	12	LIGHT STANDARD FOUNDATION SD3.010 AT _____ EACH		
812.20	1	LIGHTING LOAD CENTER FOUNDATION AT _____ EACH		
812.992	12	ORNAMENTAL LIGHT FIXTURE TYPE A (PEDESTRIAN) AT _____ EACH		
813.30	220	WIRE TYPE 7 NO. 10 GENERAL PURPOSE AT _____ PER FOOT		
813.32	310	WIRE TYPE 7 NO. 6 GENERAL PURPOSE AT _____ PER FOOT		
813.34	380	WIRE TYPE 7 NO. 2 GENERAL PURPOSE AT _____ PER FOOT		
813.521	4,380	WIRE TYPE 10 - #10 GROUNDING AND BONDING AT _____ PER FOOT		
813.72	12	GROUND ROD 10 FEET LONG AT _____ EACH		
813.80	1	SERVICE CONNECTION (OVERHEAD) AT _____ LUMP SUM		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
823.61	1	HIGHWAY LIGHTING LOAD CENTER NO.1 AT _____ LUMP SUM		
823.72	13	HIGHWAY LIGHTING ARM AND LUMINAIRE REMOVED AND RESET AT _____ EACH		
824.62	3	SOLAR-POWERED FLASHING SIGN ASSEMBLY AT _____ EACH		
826.7	12	ELECTRIC SERVICE RISER RELOCATION AT _____ EACH		
831.	88	ROADSIDE GUIDE SIGN (D6/D8) - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
832.	670	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
841.2	3	SUPPORTS FOR GUIDE SIGN (D6-5 INCH TUBULAR POST) STEEL AT _____ EACH		
847.1	114	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		
850.41	5,280	ROADWAY FLAGGER AT _____ PER HOUR		

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851.1	2,790	TRAFFIC CONES FOR TRAFFIC MANAGEMENT AT _____ PER DAY		
852.	1,437	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		
852.11	200	TEMPORARY PEDESTRIAN BARRICADE AT _____ EACH		
852.12	6	TEMPORARY PEDESTRIAN CURB RAMP AT _____ PER FOOT		
853.1	10	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
854.016	72,370	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		
854.036	14,480	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) AT _____ PER FOOT		
854.5	110	RAISED PAVEMENT MARKER REMOVAL AT _____ EACH		
856.12	3,290	PORTABLE CHANGEABLE MESSAGE SIGN AT _____ PER DAY		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
859.	120,000	REFLECTORIZED DRUM AT _____ PER DAY		
864.04	2,360	PAVEMENT ARROWS AND LEGENDS REFLECTORIZED WHITE (THERMOPLASTIC) AT _____ PER SQUARE FOOT		
864.35	225	SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW AT _____ EACH		
866.04	2,560	GREEN BICYCLE LANE TREATMENT (MMA) AT _____ PER SQUARE FOOT		
866.106	25,030	6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
866.112	4,260	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
867.106	16,459	6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
867.112	40	12 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
874.	26	STREET NAME SIGN AT _____ EACH		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
874.2	6	TRAFFIC SIGN REMOVED AND RESET AT _____ EACH		
874.4	110	TRAFFIC SIGN REMOVED AND STACKED AT _____ EACH		
901.	15	4000 PSI, 1.5 INCH, 565 CEMENT CONCRETE AT _____ PER CUBIC YARD		
903.	5	3000 PSI, 1.5 INCH, 470 CEMENT CONCRETE AT _____ PER CUBIC YARD		
983.2	65	RIPRAP AT _____ PER CUBIC YARD		
996.4	3,360	PREFABRICATED MODULAR BLOCK GRAVITY RETAINING WALL AT _____ PER SQUARE FOOT		
Total Qty:	508,424.7			